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KC-10A CARGO SYSTEM MOCK-UP TEST, (U)
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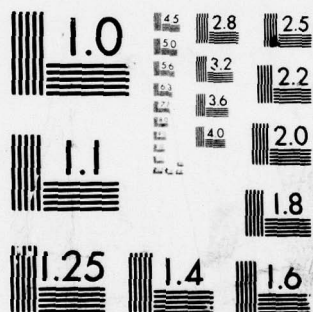
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6 KC-10A CARGO SYSTEM MOCK-UP TEST,

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Revision date

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116 400

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FOREWORD

This report of a test performed on the KC-10A cargo system mock-up is submitted in accordance with Data Item number DI-T-3718/1 (Sequence No. A02D) under USAF contract number F33700-78-C-0001 for the KC-10 program. The test was conducted on June 18, 19 and 20, 1979, at Long Beach, Calif., by the Douglas Aircraft Co., McDonnell Douglas Corp., 3855 Lakewood Blvd., Long Beach, Calif. 90846.

Three USAF personnel witnessed the first 2 days of testing and two of them remained for the final 1/2 day. On June 18 and 19, the following were present:

Capt. Robt. I. Marx, ASD/YTT Flt Test MGr., KC-10
 SMSgt. Willie J. Lorenz, AFALD/YT/MACSO Loadmaster
 SMSgt. Steve K. Johnson, AFTEC/TEZ Loadmaster

On June 20, Capt. Marx and Sgt. Lorenz were present.

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ABSTRACT

A test was conducted on the KC-10A Cargo Handling System Mock-Up to evaluate the performance of the current design of the powered roller system.

The test consisted of running a total of 246 load/unload cycles with various weights loaded on the pallets. Of these load/unload cycles, 135 were single HCU-6/E pallets and the remaining 111 were coupled HCU-6/E pallets (2 in train). These cycles simulate over 2 years of KC-10A palletized cargo operations.

The powered roller system functioned very well for the entire spectrum of loads. Single and coupled pallets were loaded laterally or rotated in the doorway easily. This test demonstrated that the system meets or exceeds its design requirements. ↗

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1.0 INTRODUCTION

The main cabin cargo handling system consists (in-part) of a powered roller system, which provides lateral on-loading/offloading of cargo and capability for rotating over-length cargo through the cargo doorway.

Paragraph 1051BH of the Statement of Work (SOW), dated 30 September 1977, states that: "Tests shall be initiated on the cargo loading system mock-up to evaluate control system operation and system capability to rotate overlength loads and to move coupled pallets".

A cargo loading system mock-up was built as a development tool to demonstrate the ability of the powered rollers to move and rotate single and coupled pallets; the electrical circuitry of the system; and to develop operation techniques for training and cargo loading manual inputs.

Through the development phase, the cargo loading system mock-up was modified and changed to insure that the best combination of designs were evaluated.

1.1 TEST OBJECTIVE

The primary objective of this test was to evaluate the performance of the current design of the powered roller system. The test plan was derived using the Mission Profiles of Appendix II of the SOW to simulate real life conditions. The secondary objective of this test was to evaluate the effect of reorientation of two powered rollers as outlined in Review Item (RI) C101 submitted by USAF during the Furnishings and Equipment Critical Design Review (CDR) on 14 March 1979.

1.2 DESCRIPTION OF CARGO HANDLING SYSTEM MOCK-UP

The KC-10 Cargo System Mock-up used in this test/demonstration is shown in Figure 1 and by two overview photographs, Figures 2 and 3.

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The mock-up consists of simulated loader and the KC-10A cargo handling system from fuselage stations 625 to 960 (approximately). Details of the mock-up include:

1) Loader Simulation

To simulate the bed of a USAF 40K loader, cylindrical rollers were used adjacent to the aircraft door and the guide rails were spaced at 108.5 inches. The guide rails were flared open at the end as on the 40K loader.

2) Airplane Simulation

- a) The cargo door sill conveyor assembly was simulated by a row of cylindrical rollers and an aft door jamb protector bracket (production part). These items were installed at the doorway area.
- b) Production omni-directional rollers were mounted on plywood simulating the KC-10A omni-directional conveyor assemblies.
- c) Eight powered rollers were installed in cutouts in the plywood. Locations are identical to the KC-10A system. The roller assemblies had prior usage during the development phase of the mock-up, but each roller shell had new tread on it for this test/demonstration. In Figure 4, the new tread can be seen as well as the aluminum alloy rings on the ends of the roller. The end rings are a production change which has been made to protect the tread from gouging by the latch detents on the edges of the HCU-6/E cargo pallets.
- d) The left-hand guide rail was positioned at $X = +108.69$, simulating the 27 pallet arrangement.
- e) The right-hand guide rail was positioned at $X = -88.69$. The guide rail has notches cut in it to simulate the individual segments of rails located in the omni-directional area of the KC-10A cargo handling system (Refer to Figure 3).
- f) A production type pendant control was used for this test/demonstration. The pendant is located at the forward edge of the simulated cargo door area.

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1.3 DESCRIPTION OF TEST ARTICLES

Two HCU-6/E cargo pallets manufactured by the Browline Division of Brooks and Perkins, Inc. were used for the test. "Flight test" weights were loaded on the HCU-6/E pallets to simulate the various weights of pallets.

A Douglas design pallet coupler was used to couple the HCU-6/E pallets together. This coupler is described in Paragraph 3.0 of this report.

1.4 CARGO SYSTEM MOCK-UP TEST PLAN

A test plan, based on the following, was developed to evaluate the performance of the powered roller system.

Mission profiles discussed in Appendix II of the SOW were used to determine the number and character of single and coupled pallet loads that would be carried aboard the KC-10A during its 20 year life span. This pallet study is found in Appendix C.

The equivalent of two years of service was considered sufficient to evaluate the powered roller system.

A total of 246 load/unload cycles were run, with pallets weight between 2000 and 10,000 pounds. A load cycle is defined as the movement of a pallet load from the "loader" into the "airplane" and back out to the "loader". The first 236 cycles simulated the 2 years of projected KC-10 service and the remaining 10 cycles were run with powered rollers numbers 4 and 5 rotated 90° clockwise to evaluate the effects this arrangement would have on pallet handling capabilities (Reference RI C101).

The following chart lists the sequence of events in the mock-up test/demonstration.

SEQUENCE OF ACTIVITY - CARGO SYSTEM MOCK-UP TEST				
TEST RUN	PALLET CONFIG.	PALLET LOAD 1000'S LB.	PALLET EXCURSION*	CYCLES**
1	Single	5	To RS	45
2	Single	10	To RS	5
3	Single	5	To LS	45
4	Single	10	To LS	5
5	Single	5	Rotate To LS	20
6	Single	10	Rotate To LS	5
7	Coupled 108" Side	6/6	To RS	10
8	Coupled 108" Side	2/2	To RS	75
9	Coupled 108" Side	2/4	Rotate To LS	10
10	Coupled 88" Side	2/4	Rotate To RS	10
11	Coupled 108" Side	4/6	Rotate To LS	3
12	Coupled 88" Side	4/6	Rotate To LS	3
SUBTOTAL				236
FOR RUNS 13-21, POWERED ROLLERS 4 & 5 WERE ROTATED 90° CLOCKWISE (REF. FIG'S. 21 & 22).				
13	Coupled 88" Side	4/4.2	Rotate To RS	1
14	Coupled 108" Side	4/4.2	Rotate To LS	1
15	Coupled 108" Side	4/4.2	To RS	1
16	Single	5	To RS	1
17	Single	5	To LS	2
18	Single	5	Rotate To LS	1
19	Single	5	To RS	1
20	Single	10	To RS	1
21	Single	10	Rotate To LS	1
TOTAL				246

* RS = Right side channel of pallets in airplane;
LS = Left side.

** One cycle is movement of pallet from loader into airplane and back out to loader.

2.0 SINGLE PALLET OPERATION

A total of 125 load cycles was run with single pallets having loads of 5000 or 10,000 lb., 100 cycles being straight lateral translations, simulating loading into a 25 pallet all-cargo configuration as shown in Figure 5, and 25 load cycles were rotated on entry and exit simulating loading the left-hand side of a 27 pallet all-cargo configuration.

After the first 10 cycles, a cut approximately 0.6 in. long appeared on the tread of one roller (see Figure 6) but it did not increase during the remainder of the entire test.

Figure 7 shows a chip in the tread of roller No. 5 that was discovered after the first 48 cycles, the last 3 cycles at a 10,000-lb. load. Figure 8 shows that a pallet being offloaded may not be misaligned or it won't enter the loader's guide rails easily. In Figure 9, a pallet is in the process of rotation, and Figure 10, a chamfer on the end ring of a roller occurred when the edge of a pallet was positioned on the edge of the roller. In Figure 11, a pallet was positioned so that one of its latch detents was against the door jamb protector bracket to determine if a hook-up would occur. The remedy for this condition is to pull the pallet away from the bracket by use of the powered rollers.

After 122 load cycles, it was noticed that roller No. 4 would not raise up when energized to drive toward the right side. The frame of the roller was bent (Figure 14) so that the erection mechanism was misaligned. The problem was corrected by replacing the frame. Simultaneously it was noticed that roller No's 4, 5 and 2 were missing one bolt each in the attachment pattern to their metal mounting plates, and at all 8 powered rollers many of the wood screws attaching the mounting plates to the wooden flooring were loose or missing. The omission of bolts and wood screws can be seen in Figure 4, 6, and 7 and is traceable to modifications made during prior development work

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done on the mock-up. All missing attachments were installed, and no further difficulties were experienced with roller operations.

Basically, the powered roller system performed this portion of the test well in moving the single pallet laterally in the aircraft or rotating in the doorway area.

3.0 COUPLED PALLET OPERATION

A total of 111 load cycles was run with coupled pallets having total loads of 4000 to 12,000 lb. for the pair of pallets. The first 85 load cycles were straight lateral translations into the airplane, and the last 26 were rotated on entry and exit. The pallets that were rotated were coupled on either the 88 inch or 108 inch dimension.

Figure 12 shows coupled pallets being loaded and Figure 13 is a close-up of the pallet coupler. This coupler provides a 1-inch space between pallets as is standard in the KC-10A Cargo Handling System. Two couplers are required to couple two pallets. No loose parts or tools are required for attachment of the couplers. In Figure 15, a pair of coupled pallets has been rotated to the right side channel in the airplane.

In Figure 16, some scuffing on the end ring of roller No. 5 is seen, and the tread chip first shown in Figure 7 is enlarged to approximately 0.7 in. long, 0.5 in wide, and 0.15 deep at the deepest point. This was observed after 230 load cycles including 20 cycles rotating coupled pallets and 25 cycles rotating single pallets.

Figures 17, 18, 19, 20 are views of all the powered rollers, taken in pairs, showing the condition of the rollers at the completion of 236 load cycles.

The powered roller system performed this portion of the test very well. Lateral movement of coupled pallets was accomplished easily and the rotation was positive.

4.0 OPERATION WITH TWO POWERED ROLLERS ROTATED 90° (RI C101)

Powered roller No's 4 and 5 were rotated 90° clockwise to a longitudinal drive fixed position in order to evaluate the function of the roller system in this configuration, refer to RI C101 generated during the Furnishing and Equipment CDR. Figure 21 shows this arrangement and Figure 22 is an overview photo.

In general, this arrangement produced a considerable amount of unwanted pallet rotation, especially on single pallets moving toward the airplane door from the airplane's right side. A 5000-lb. pallet rotated approximately 30° on entry toward the right side and 75° on exit. A 10,000-lb. pallet rotated approximately 20° on entry, and on exit was rotated 45° by the time it got to the airplane centerline (similar to Figure 24). Since 86% of the anticipated pallet loads in KC-10A operations do not require rotation, the unwanted pallet rotation associated with this mixed arrangement is very undesirable. Rotating single or coupled pallets to the left side worked quite well except for final adjustments. Figure 23 shows a pallet position on the left side with no more alignment by powered rollers possible.

In this arrangement the operator must handle more complex switching operations in rotating pallets because he must handle power controls in 4 directions instead of 2.

Aft translation produced by rollers 4 and 5 was an assist, although it did tend to produce some rotation because the point at which power is applied is eccentric to the pallet.

5.0 SUMMARY AND CONCLUSIONS

The basic powered roller system design performed very well for the entire spectrum of loads. Lateral onloading/offloading of single and coupled pallets were accomplished easily and effectively. Rotation of single and coupled pallets was positive and easy to control. The operator's pendant control techniques were easily learned and applied. This test demonstrated that the powered roller system meets or exceeds its design requirements.

Wear, tear, or tread gouging on the powered rollers was not sufficient to be considered disabling damage. All rollers were functioning normally at the completion of testing. The bent frame on roller No. 4 (causing a 50% loss of function) was traceable to loose attachment of the rollers to the mock-up flooring.

Roller tread wear was negligible, measuring .000 to .020 in. on the radius, considering that the testing simulated 2 years of KC-10A palletized cargo operation.

In addition, this test demonstrated that rotating two rollers 90°, as indicated in RI C101, created unwanted pallet rotation when moving pallets in/out of the aircraft and complicated the operator's control procedures.

During the development phase concern was expressed about the wear on the bottom surface of the HCU-6/E pallets when rotating through the cargo door. Upon the completion of this test, photographs were taken of the bottom surface of one of the pallets and a close-up of one corner, see Figures 25 and 26. The photographs show that there are numerous marks and small indentations over the bottom surface, but no serious damage. The other pallet used in the test looked the same.

These HCU-6/E pallets have been at the Long Beach facility for approximately eight years. They were first used on the DC-8 Power Pack Shuttle mock-up, through the development phase of the KC-10A mock-up,

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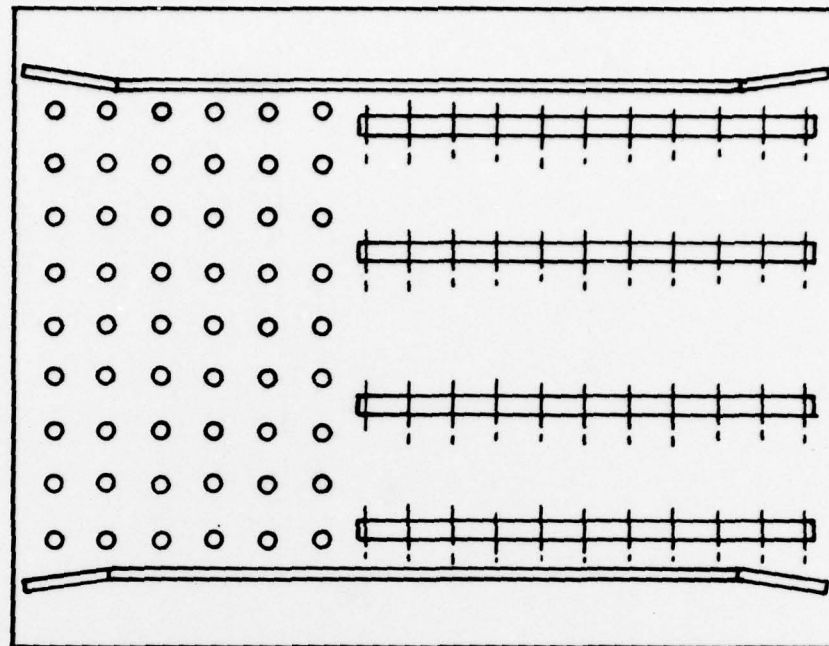
and then for the 2-year simulated KC-10A palletized cargo operation.

There is one area that should be noted. During this test a sharp edge was found on the lower corner of the pallet latch detents, as seen in Figure 13. This edge condition may have been produced by displacing and cold working the material during pallet movements on various mock-up operations, and may be the cause of roller tread damage and end ring wear that occurred during the early testing.

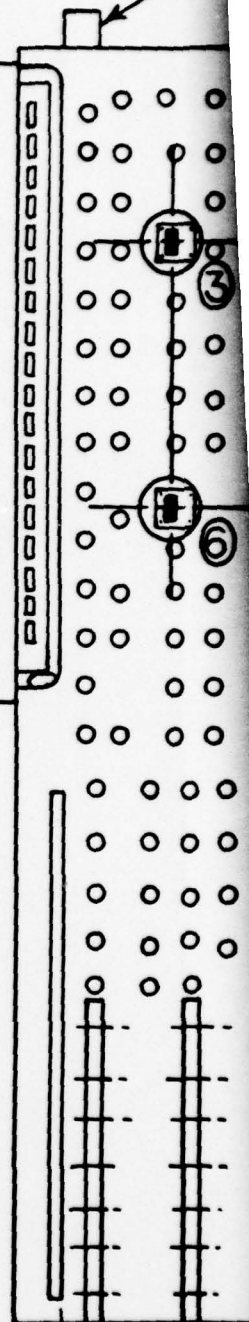
APPENDIX A
FIGURES AND PHOTOGRAPHS
OF CARGO MOCK-UP TEST

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CONTROL STATION



LOADER SIMULATION



GENERAL ARRANGEMENT —
CARGO SYS. MOCK-UP
KC-10A

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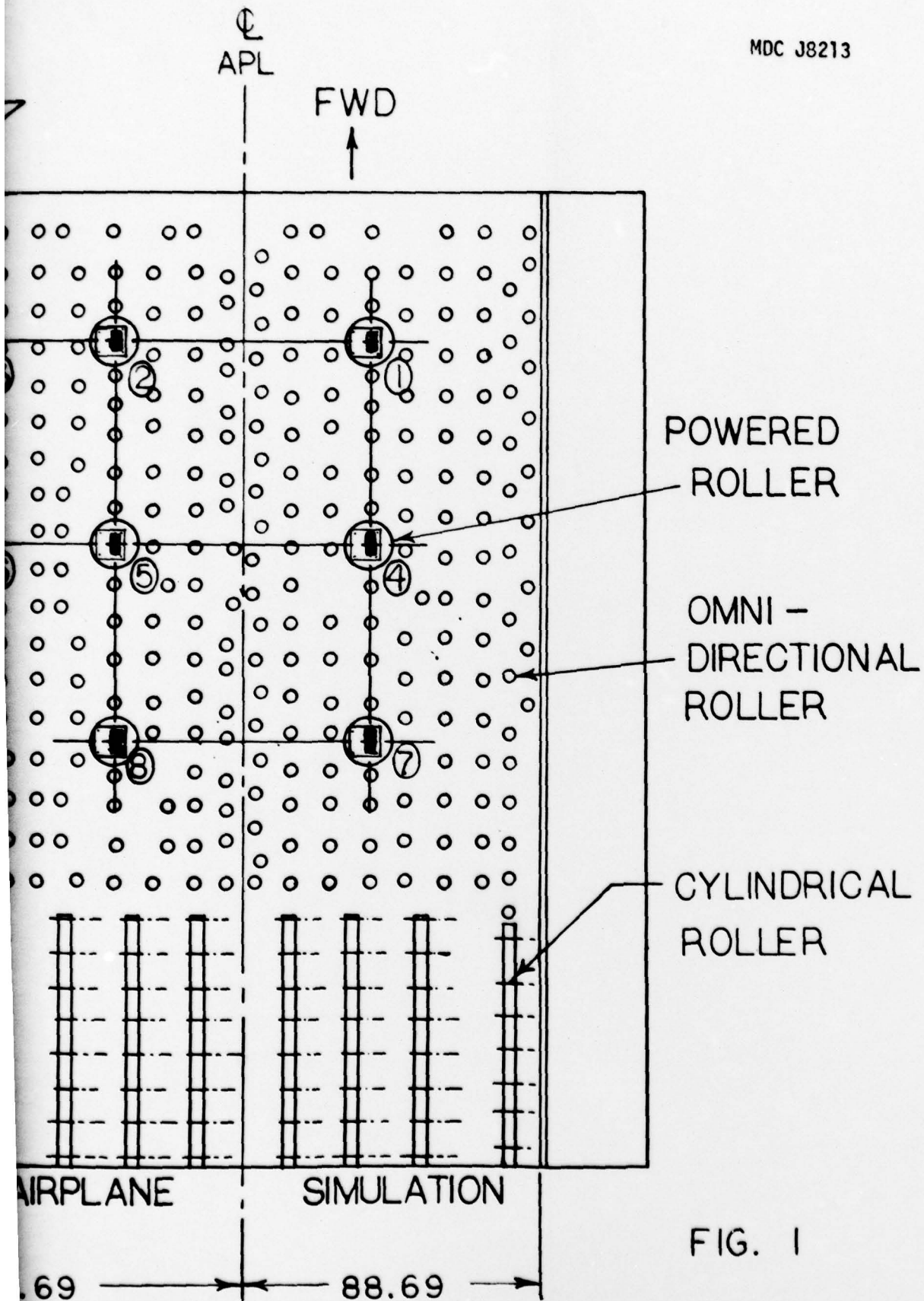


FIG. 1

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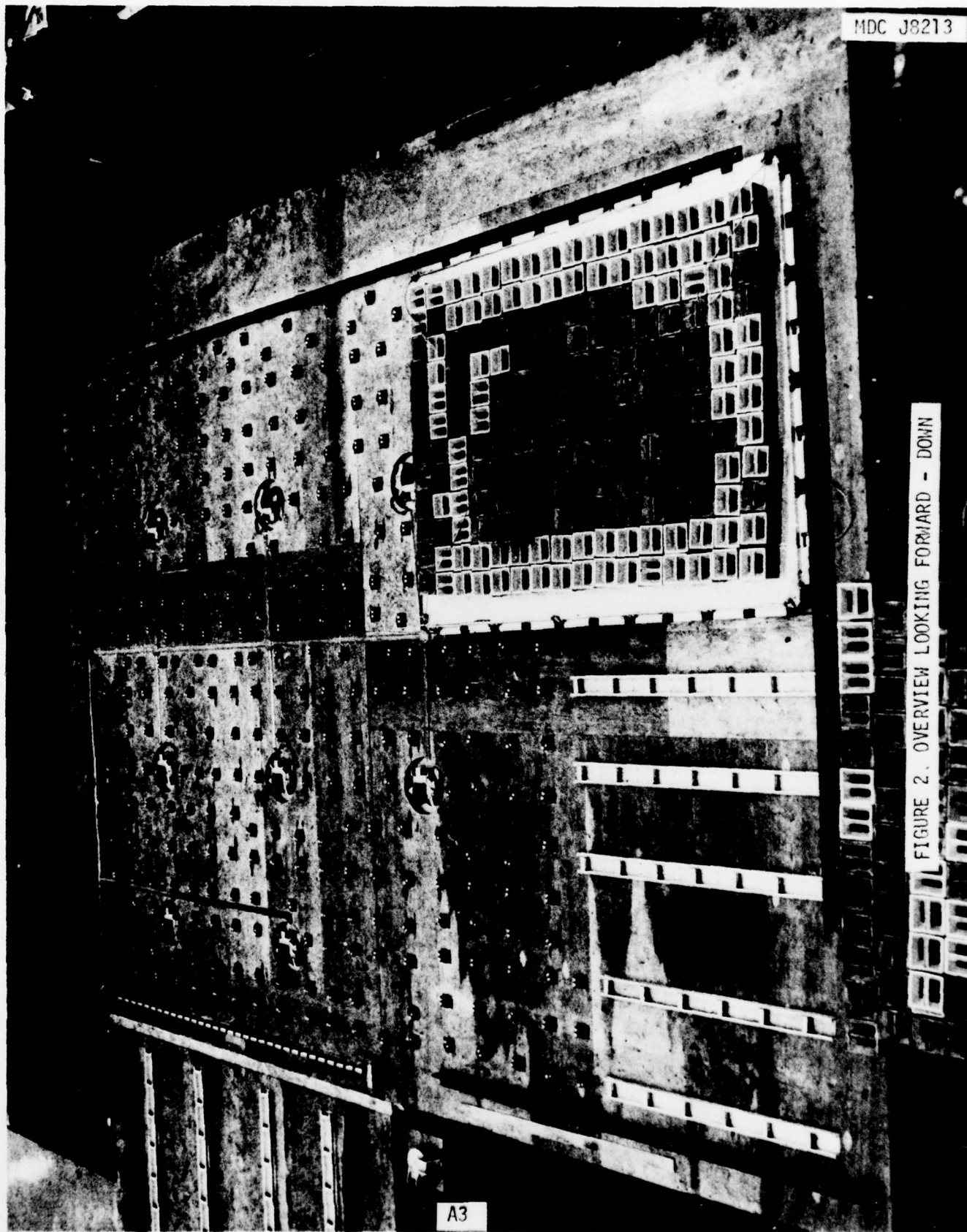
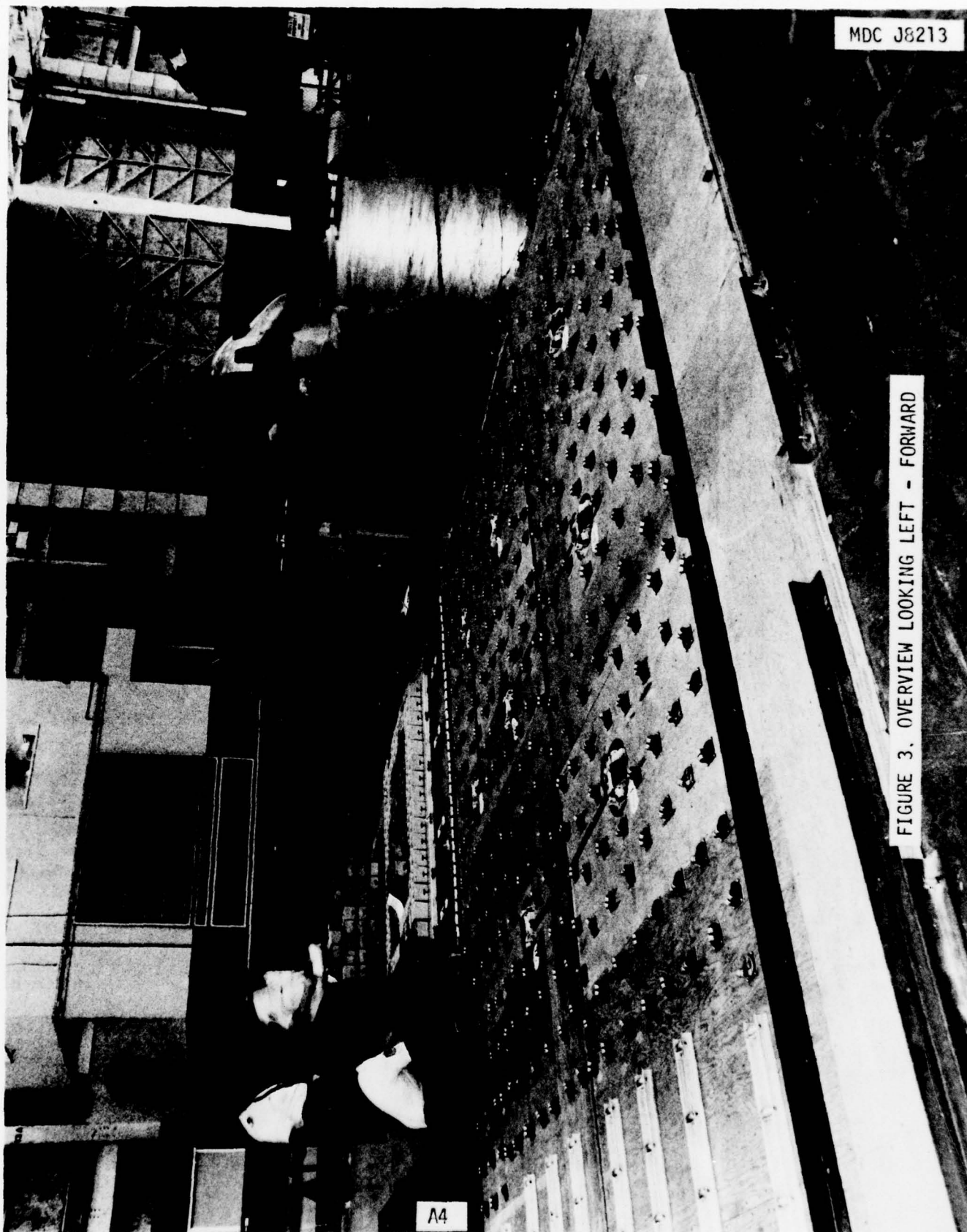


FIGURE 2. OVERVIEW LOOKING FORWARD - DOWN

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FIGURE 3. OVERVIEW LOOKING LEFT - FORWARD

A4

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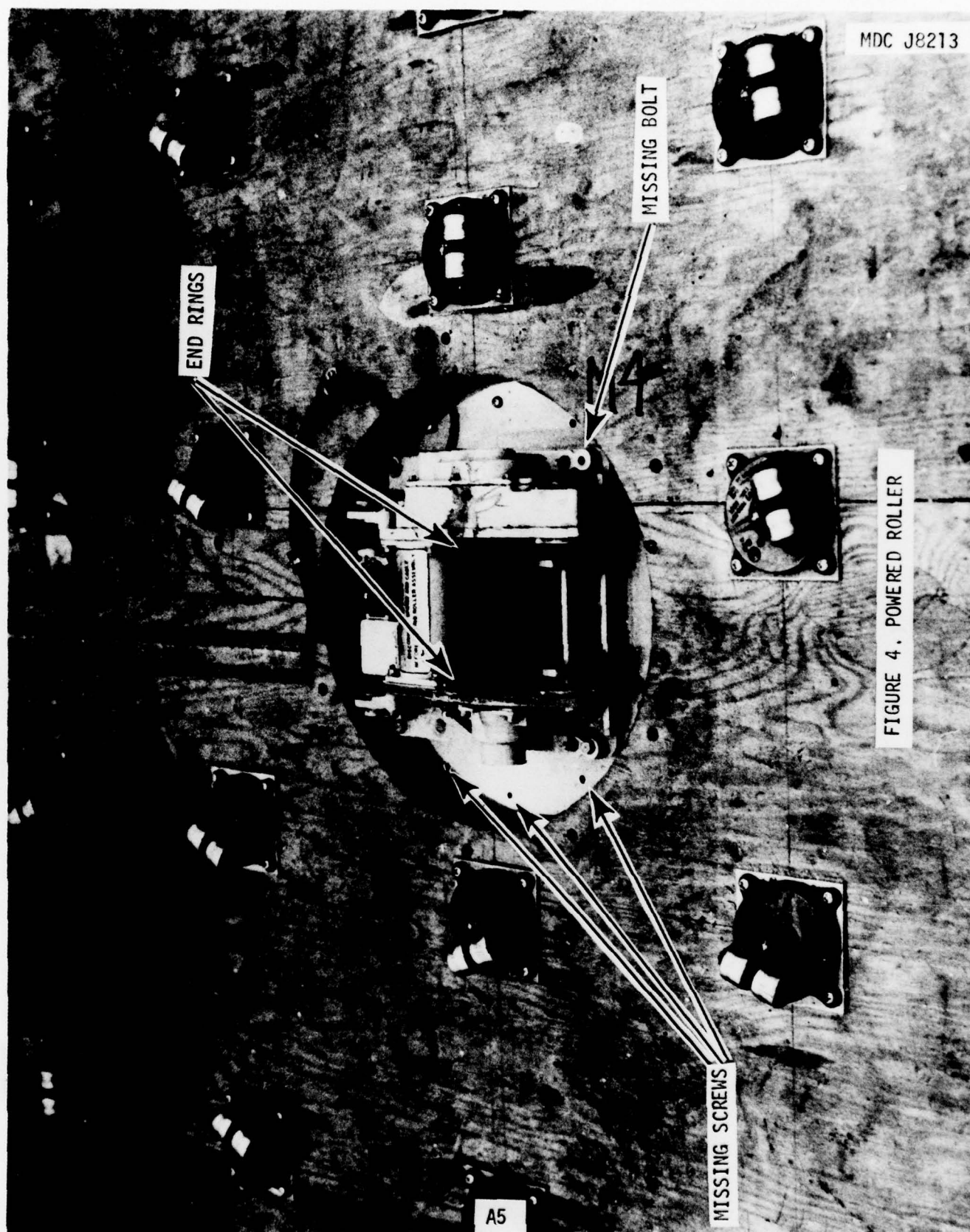
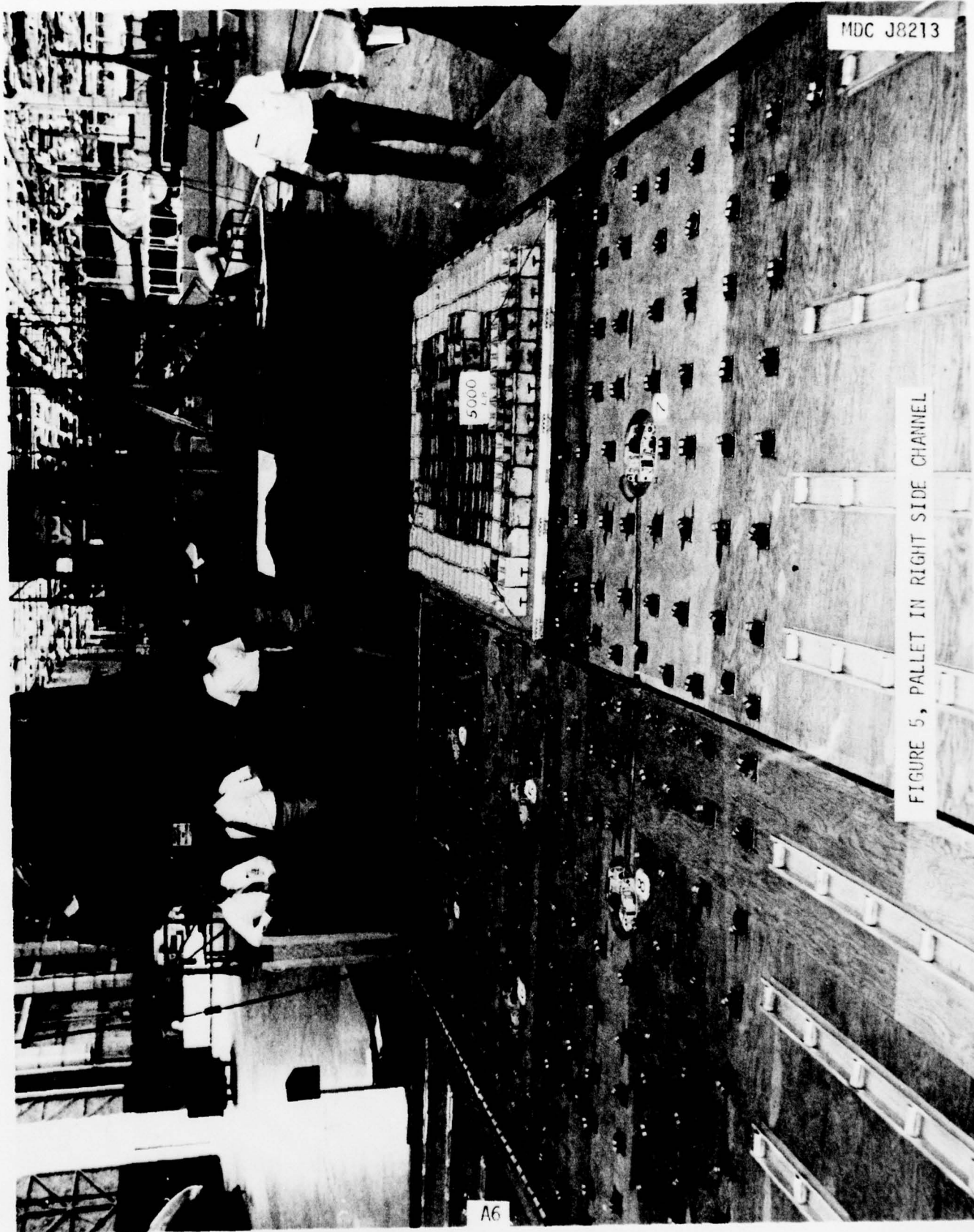


FIGURE 4. POWERED ROLLER

A5



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FIGURE 5, PALLET IN RIGHT SIDE CHANNEL

A6

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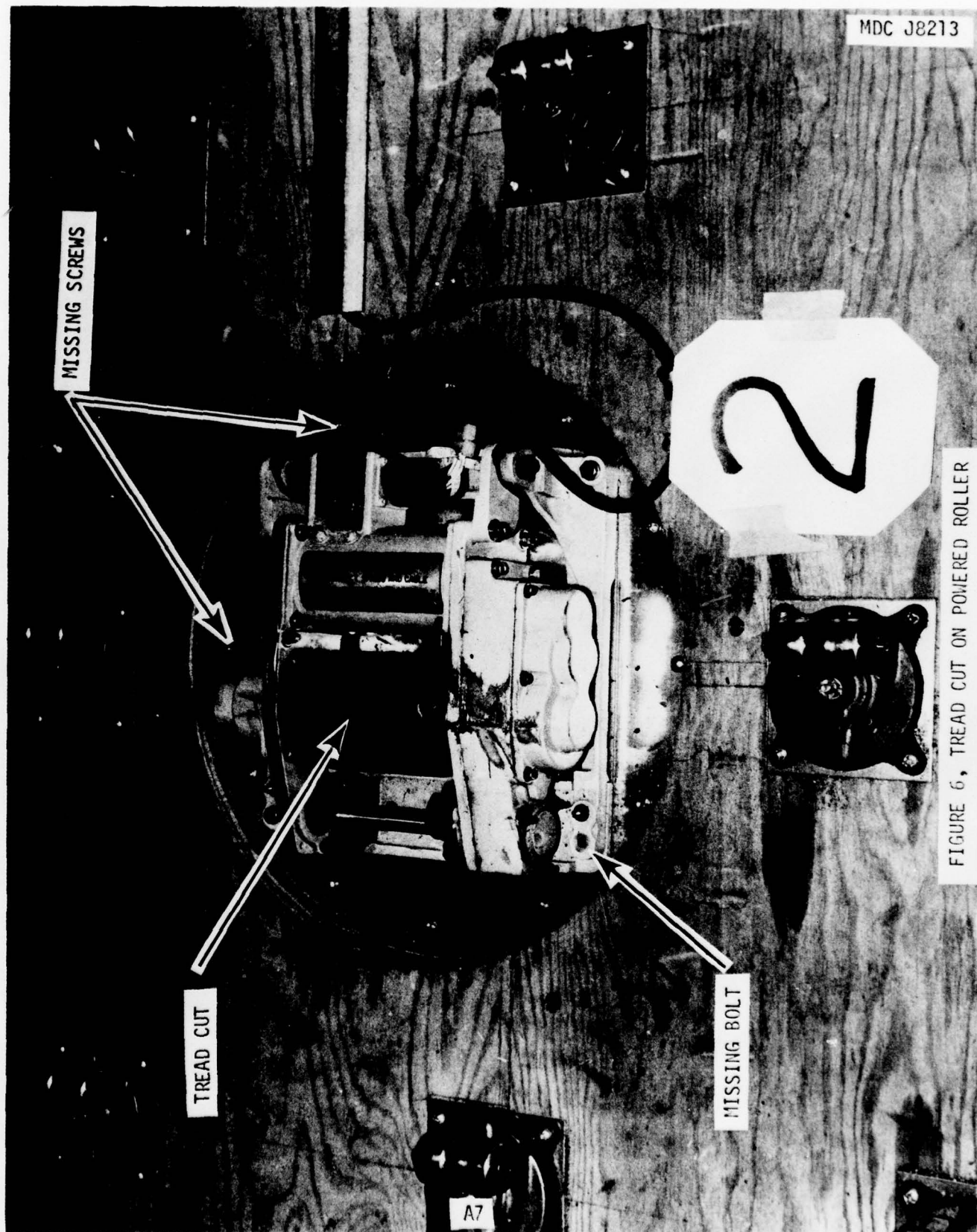


FIGURE 6, TREAD CUT ON POWERED ROLLER

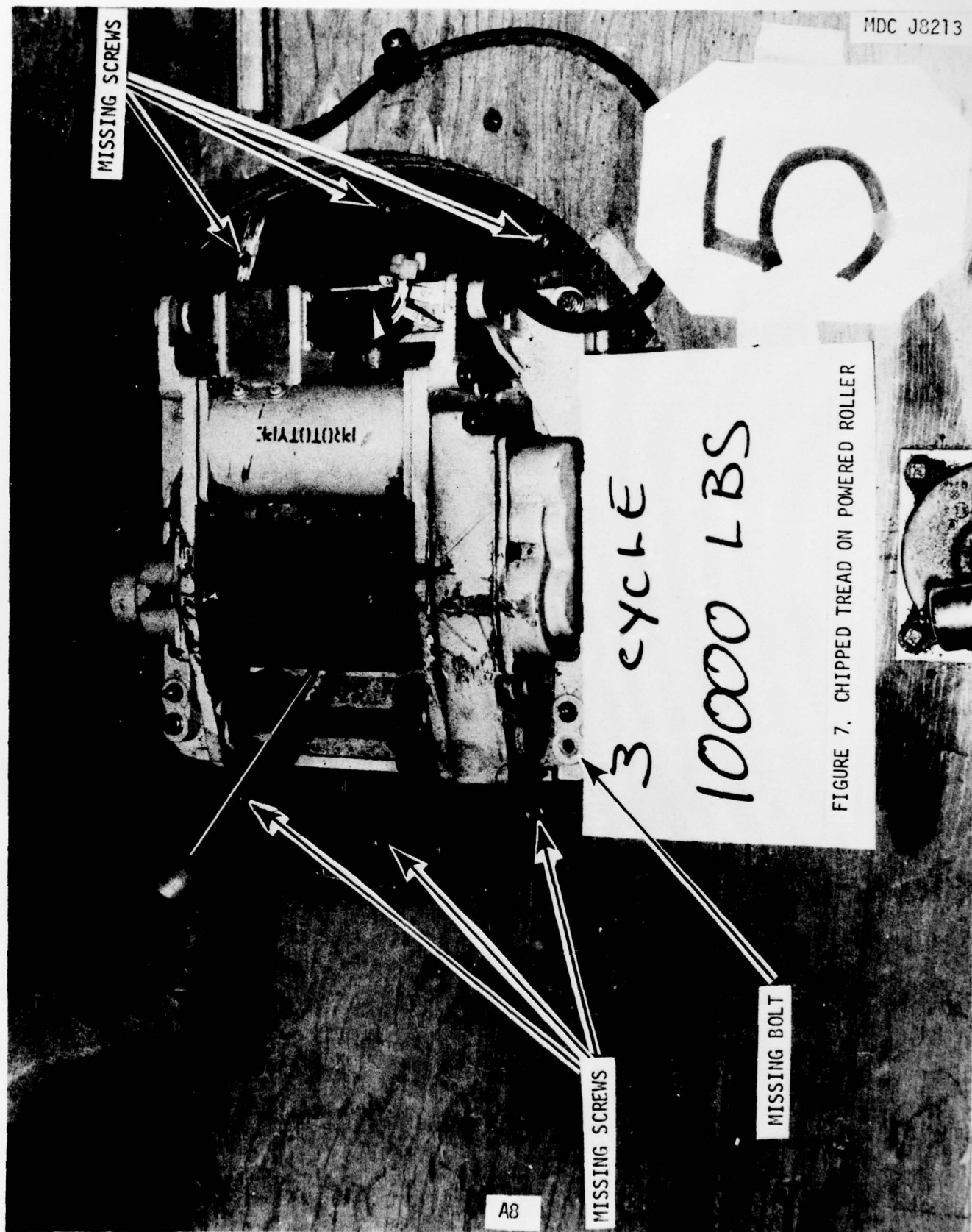
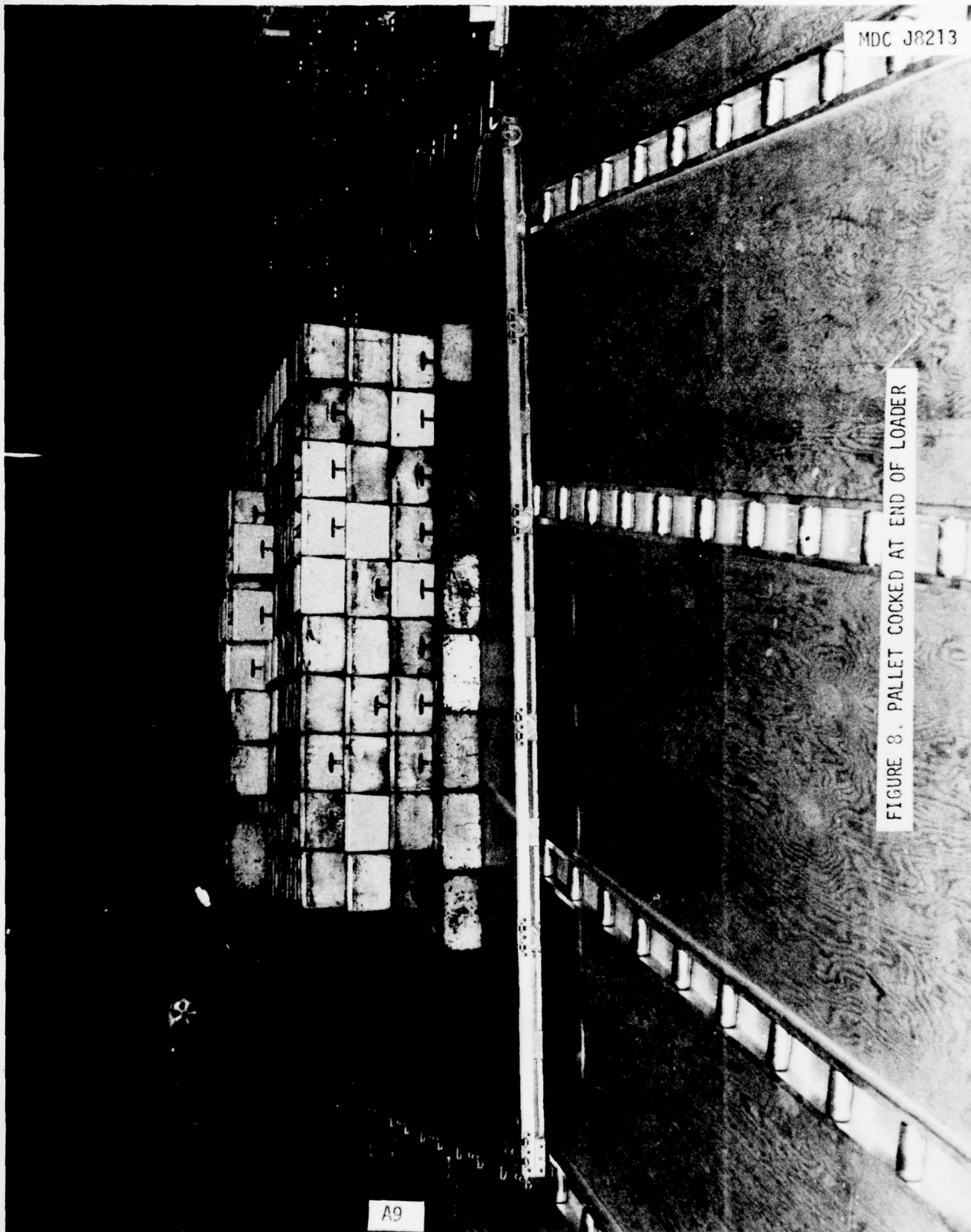


FIGURE 7. CHIPPED TREAD ON POWERED ROLLER



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FIGURE 3. PALLET COCKED AT END OF LOADER

A9

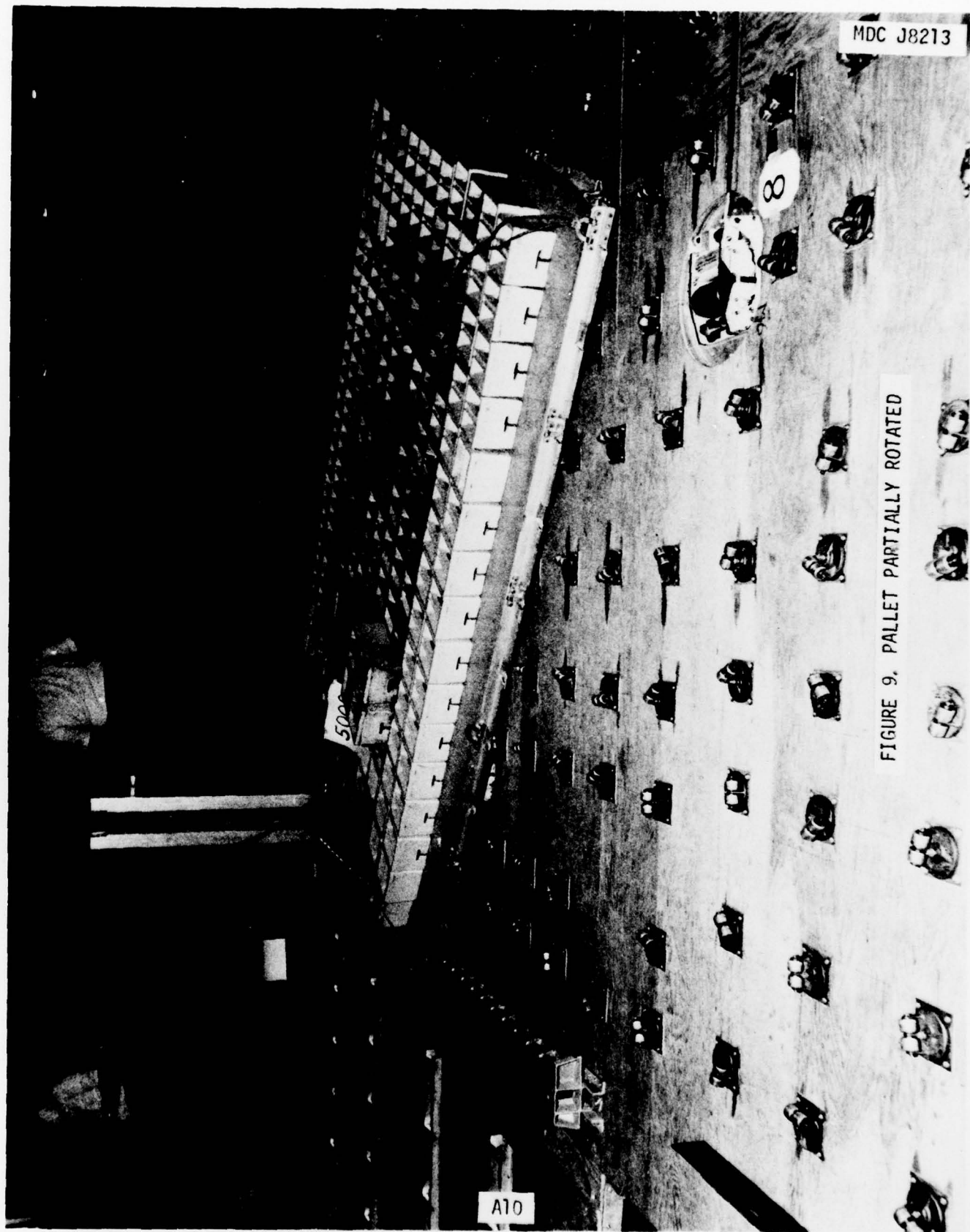


FIGURE 9. PALLET PARTIALLY ROTATED

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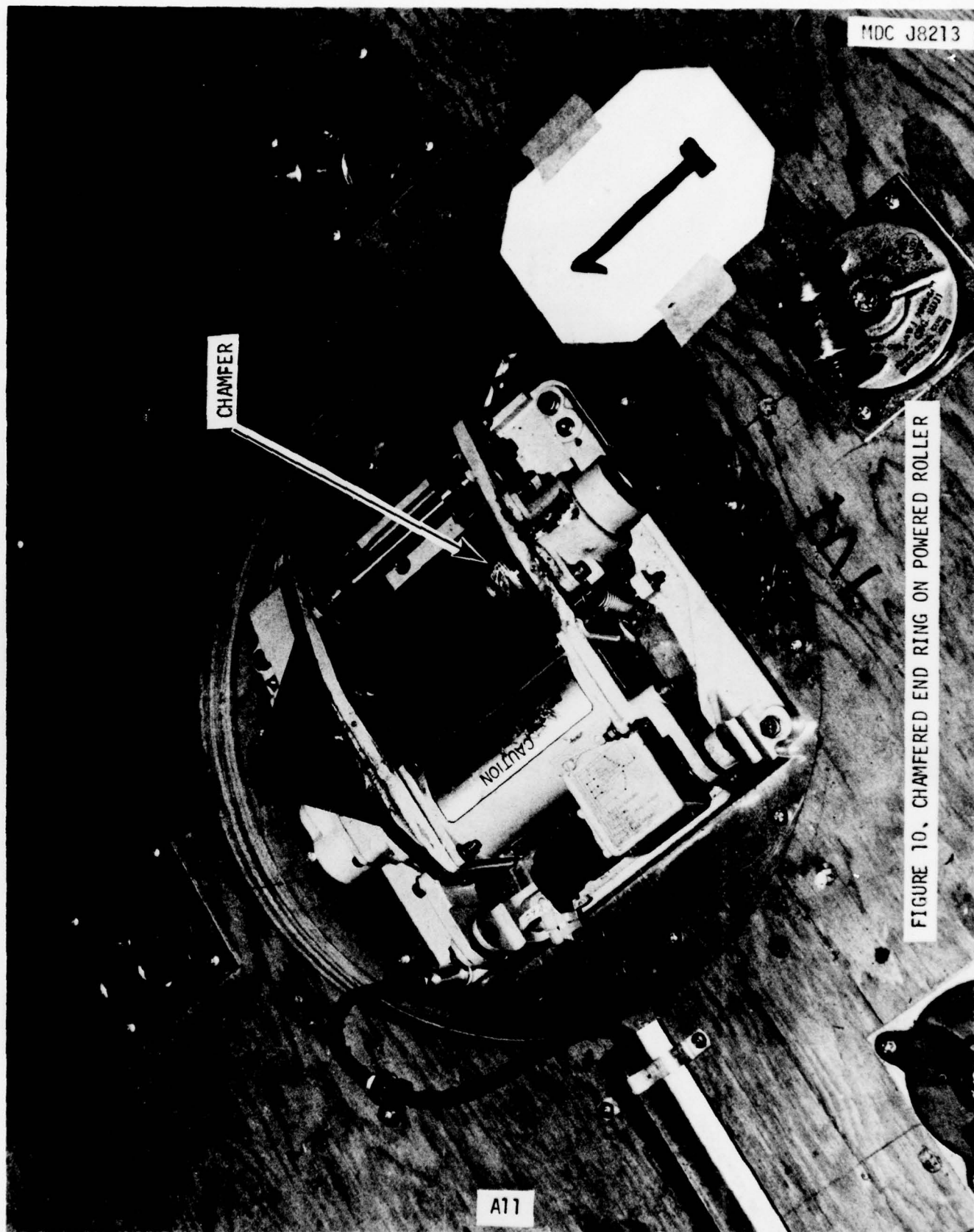


FIGURE 10. CHAMFERED END RING ON POWERED ROLLER

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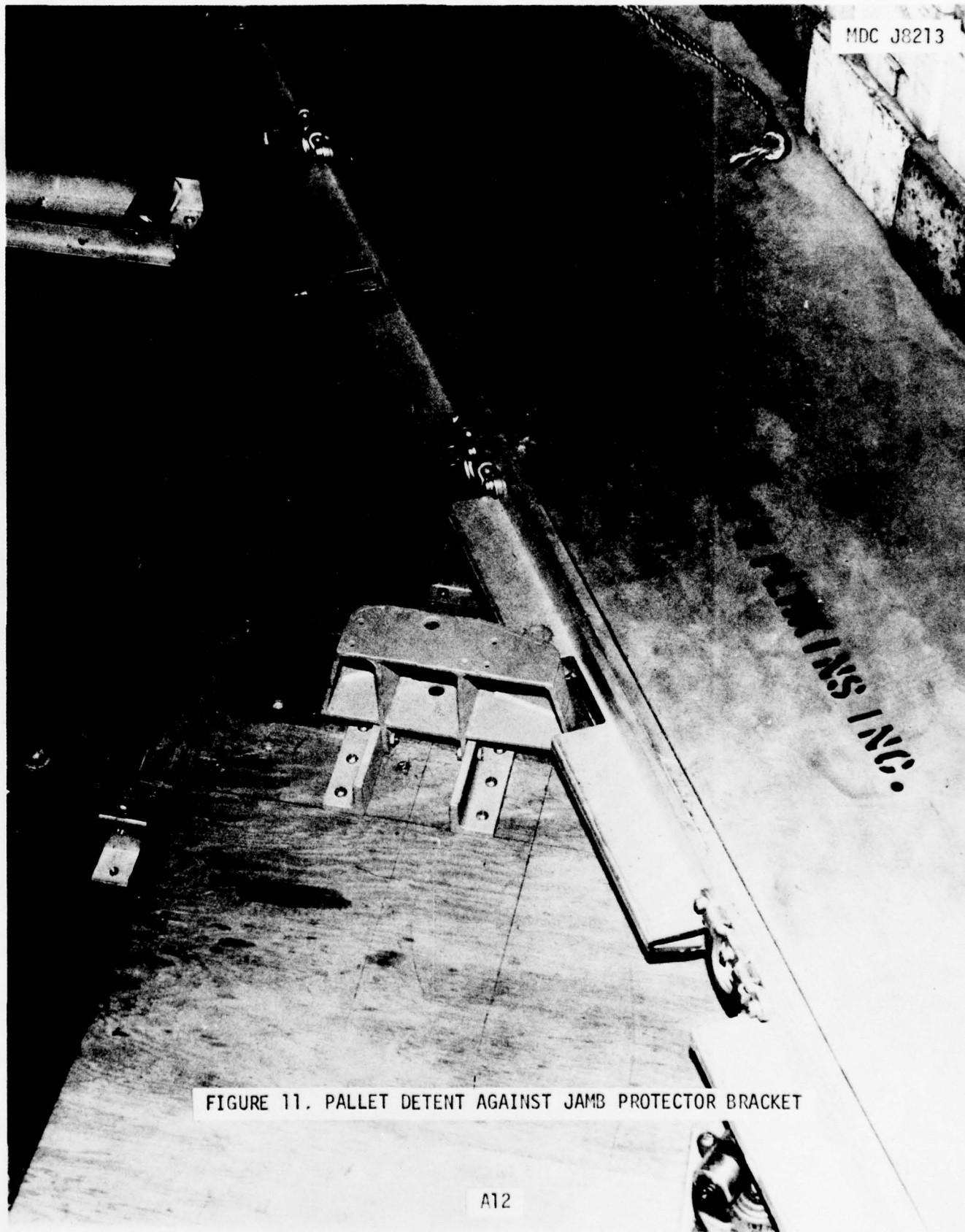
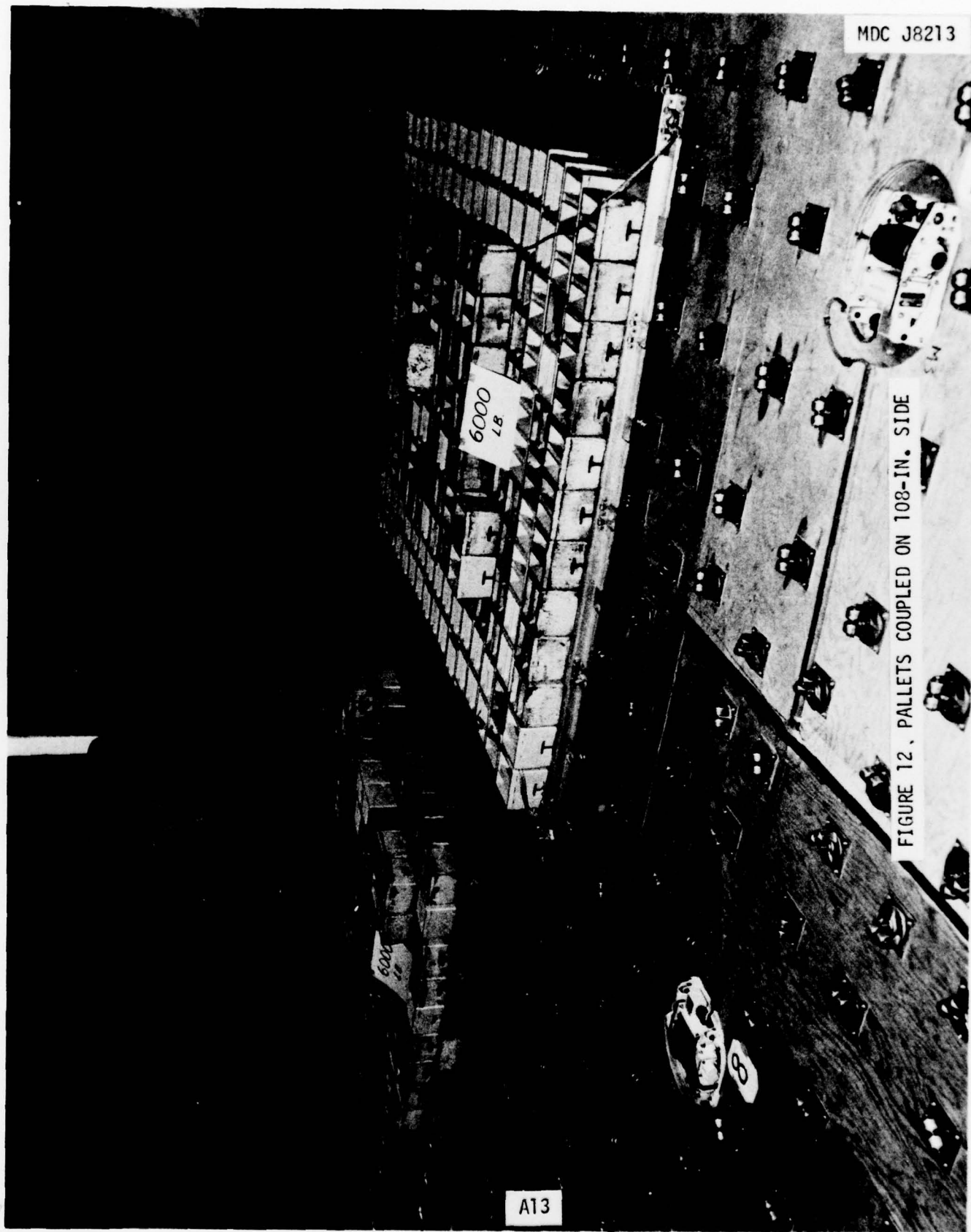


FIGURE 11. PALLET DETENT AGAINST JAMB PROTECTOR BRACKET

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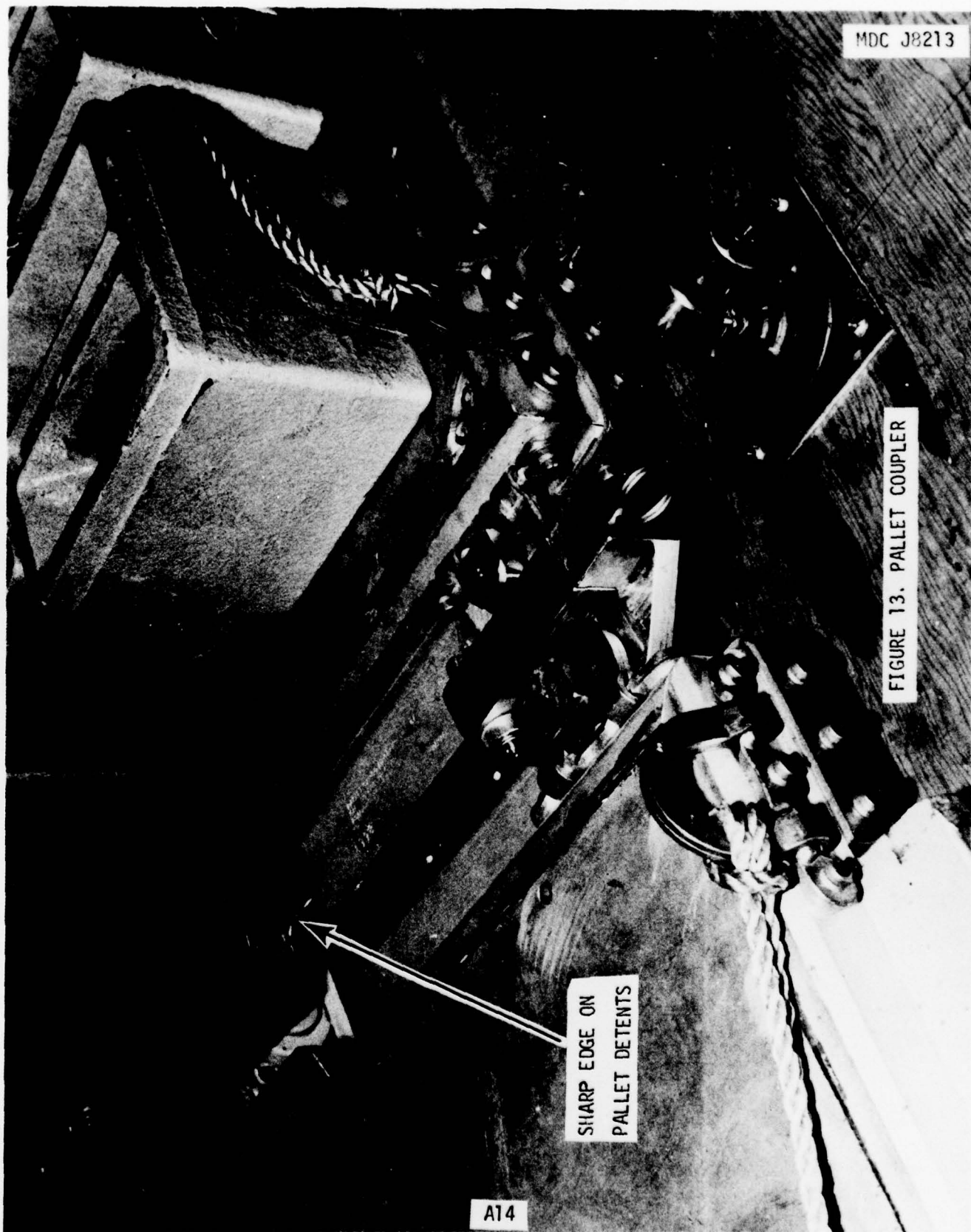
FIGURE 12. PALLETS COUPLED ON 108-IN. SIDE

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FIGURE 13. PALLET COUPLER

SHARP EDGE ON
PALLET DETENTS

A14



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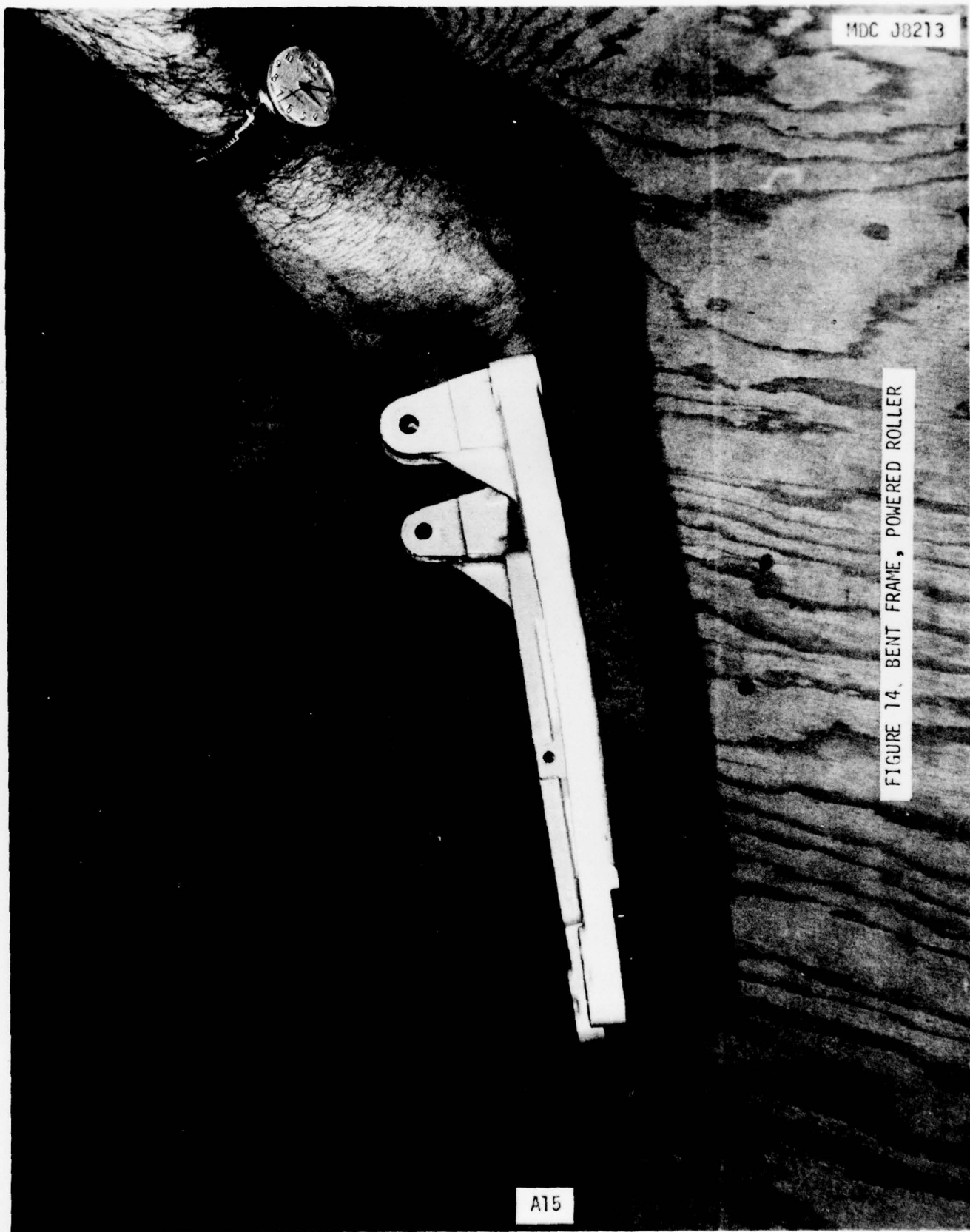


FIGURE 14. BENT FRAME, POWERED ROLLER

A15

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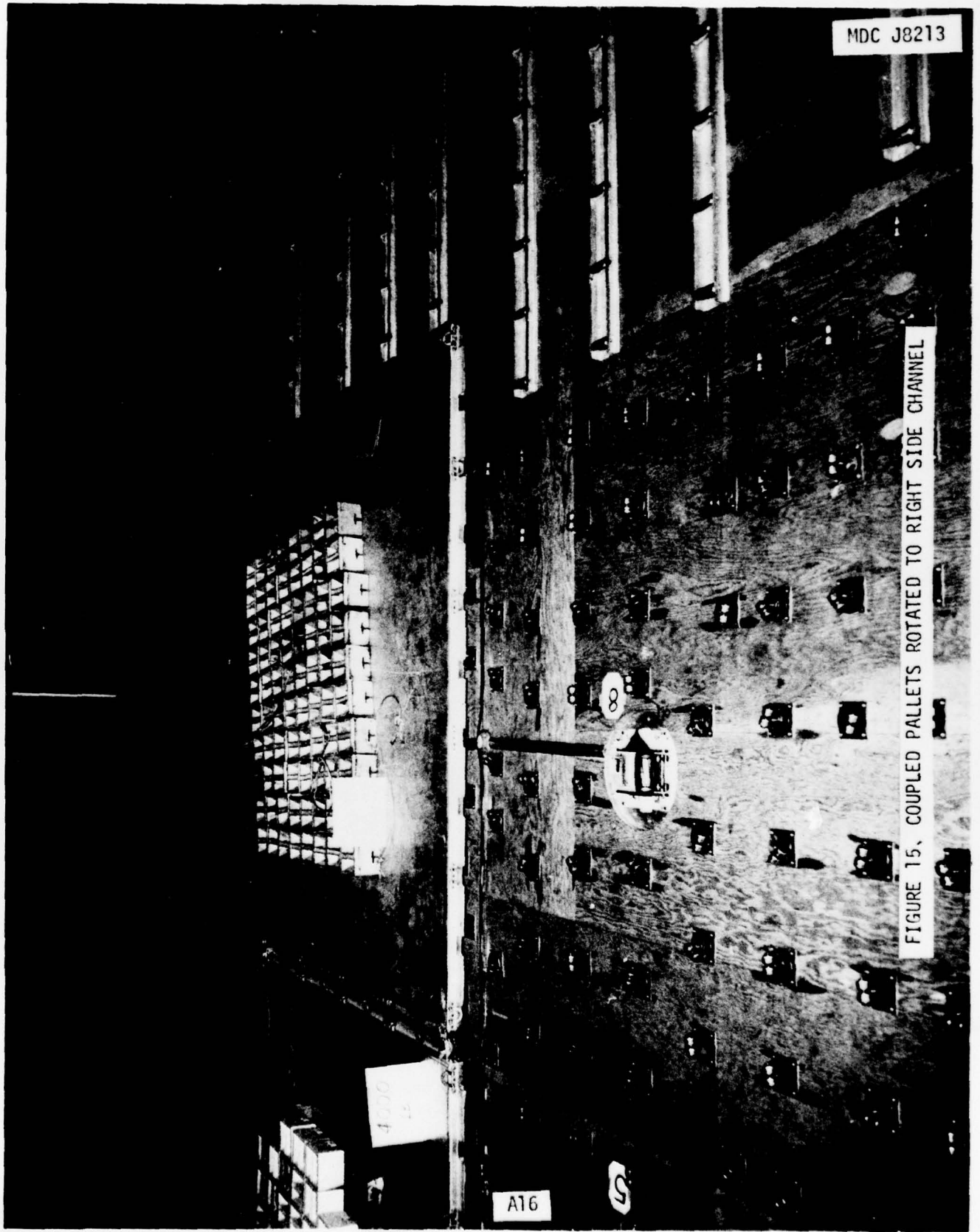


FIGURE 15. COUPLED PALLETES ROTATED TO RIGHT SIDE CHANNEL

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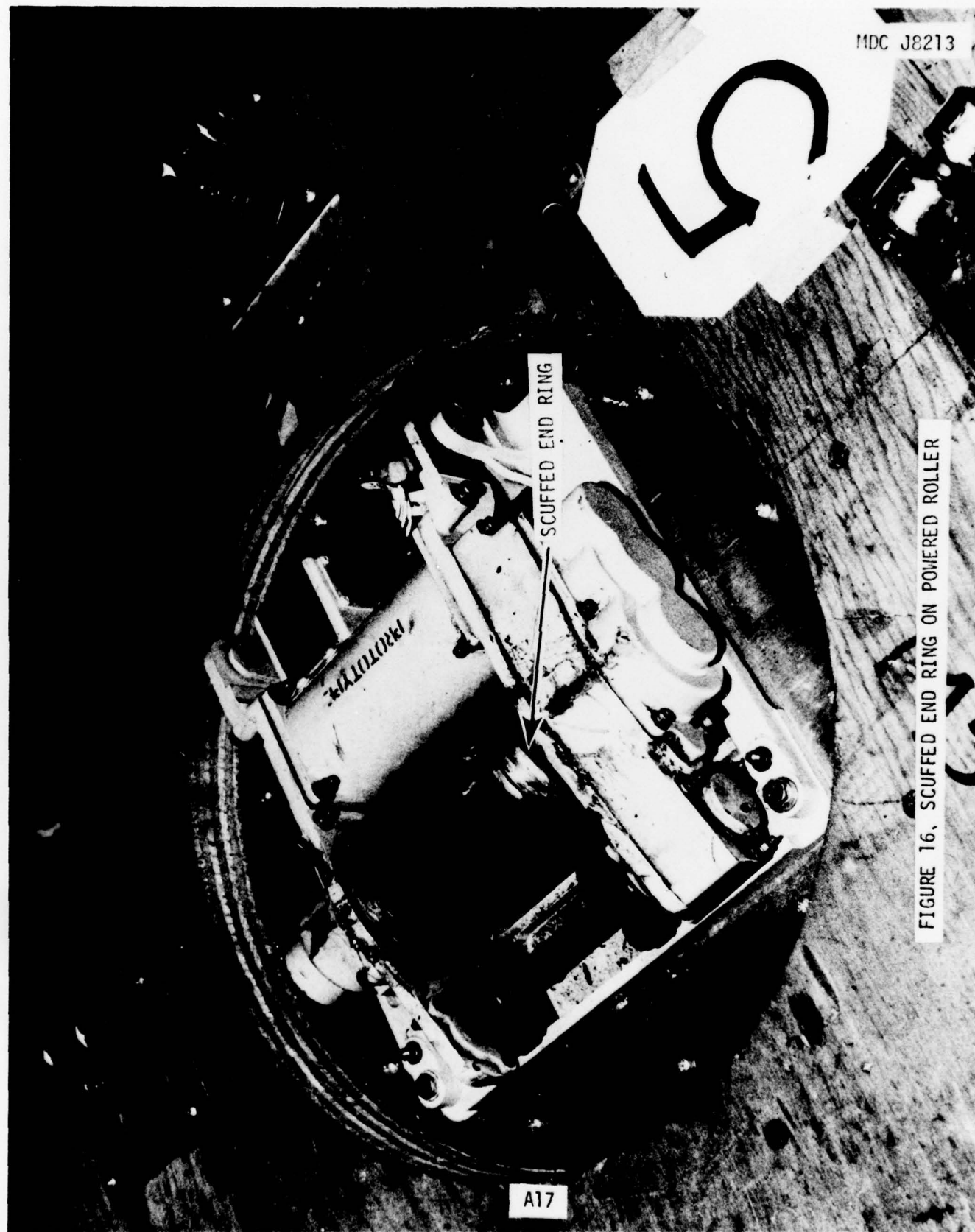


FIGURE 16, SCUFFED END RING ON POWERED ROLLER

A17

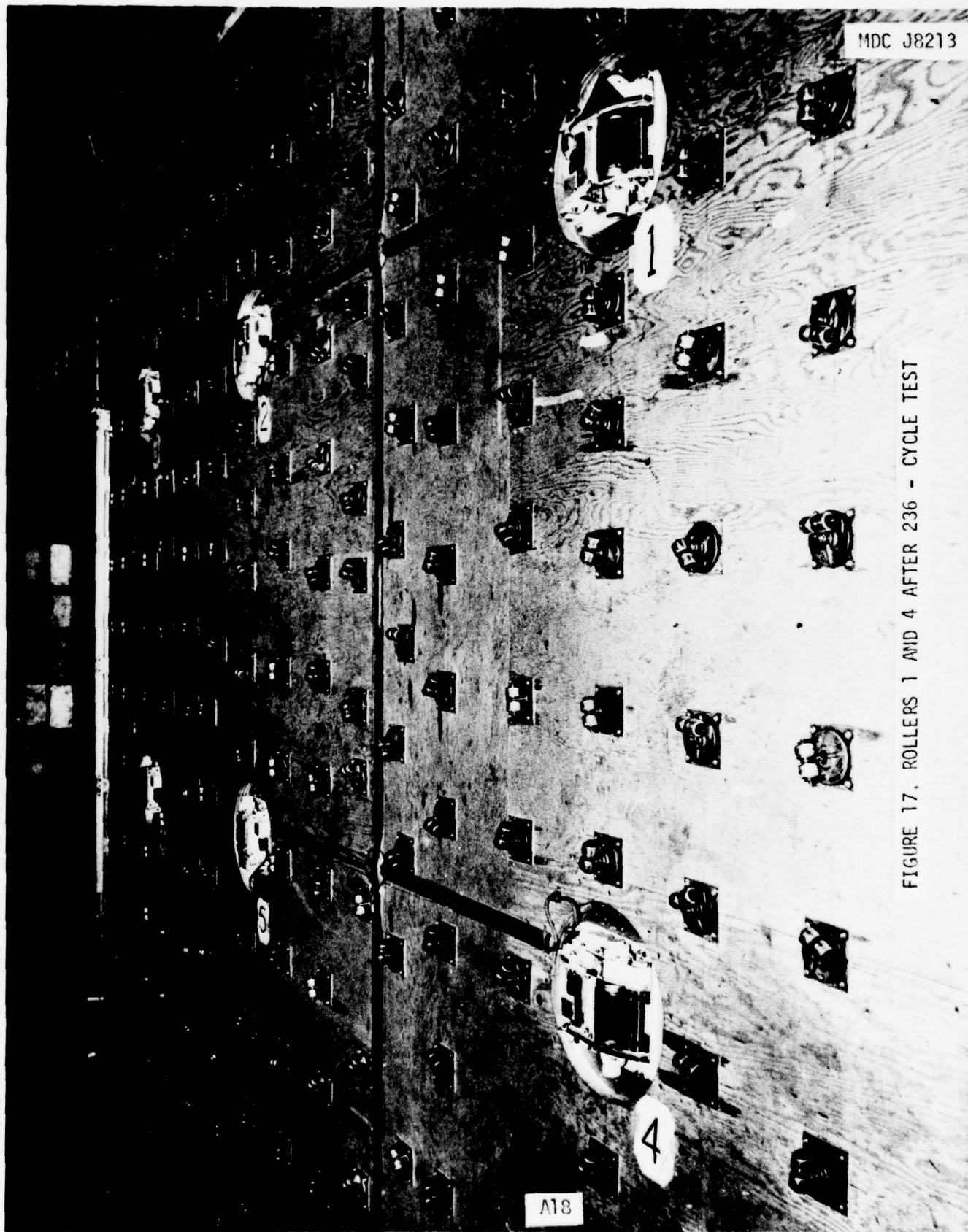


FIGURE 17. ROLLERS 1 AND 4 AFTER 236 - CYCLE TEST

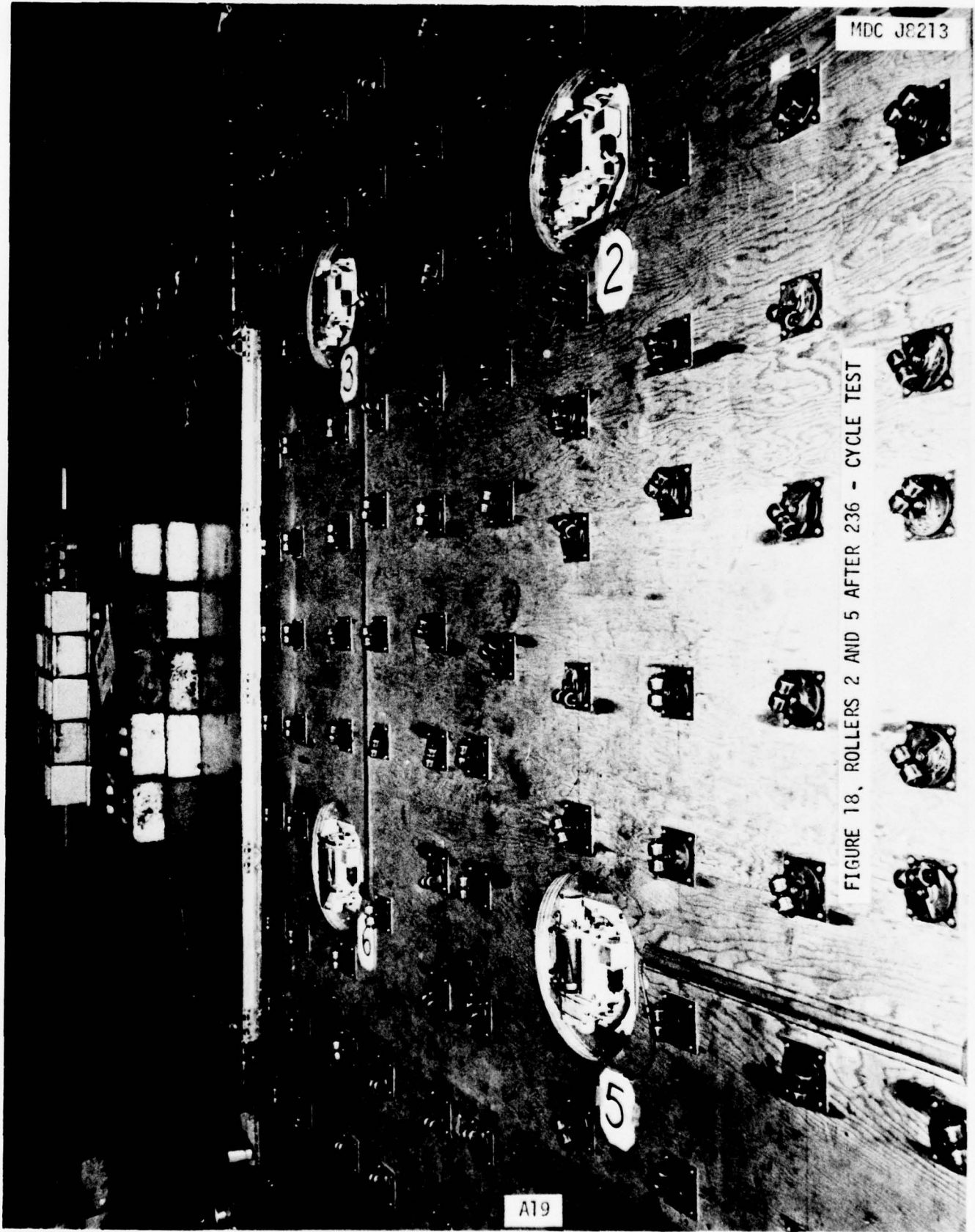


FIGURE 18, ROLLERS 2 AND 5 AFTER 236 - CYCLE TEST

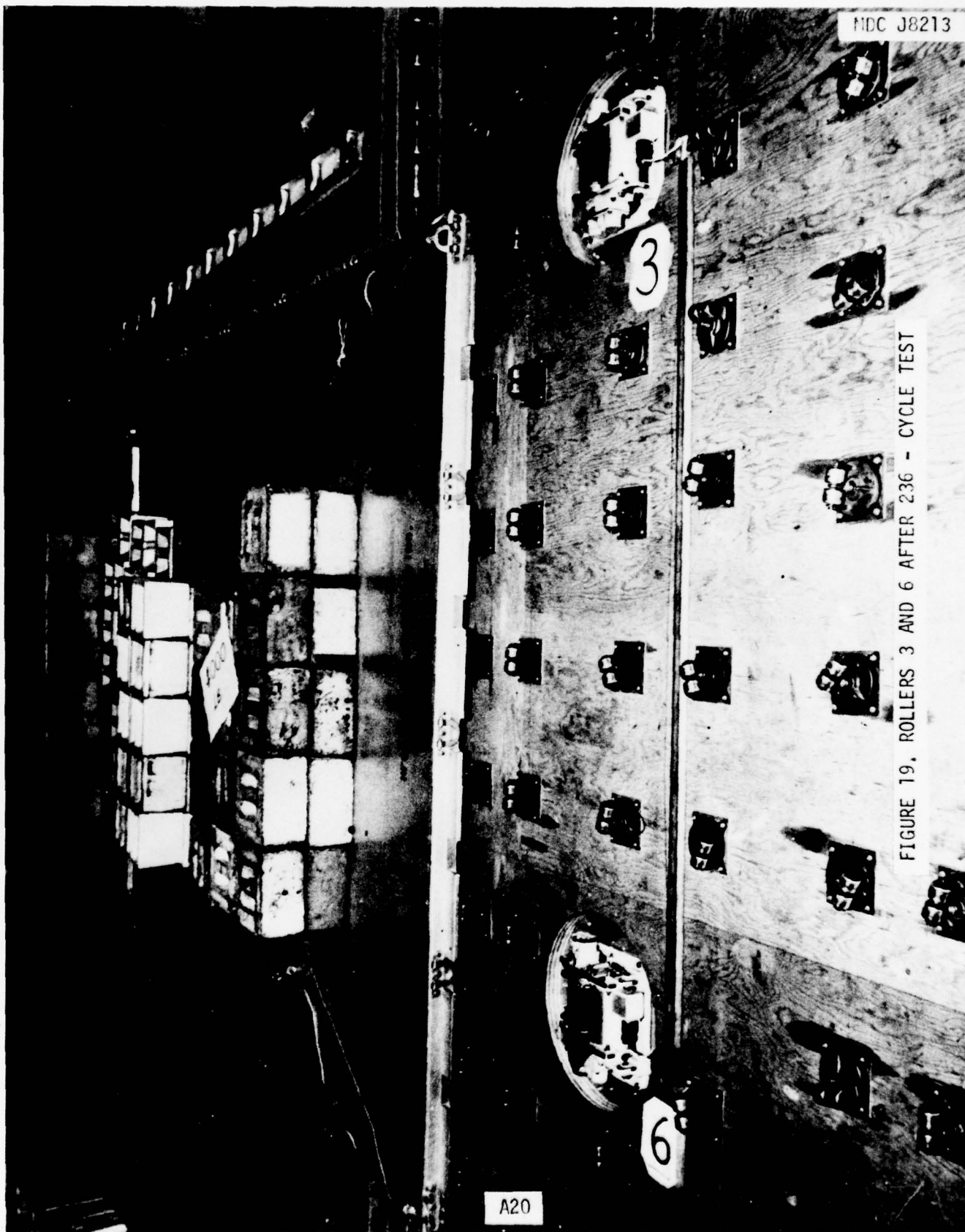
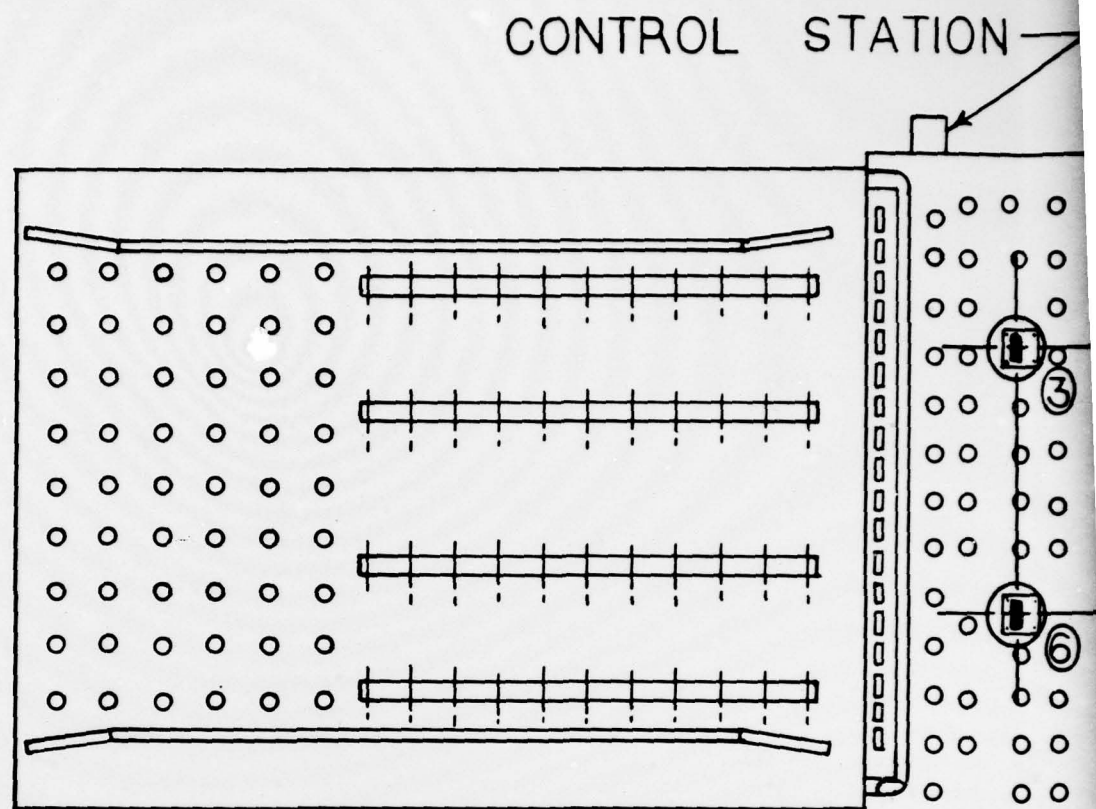


FIGURE 19, ROLLERS 3 AND 6 AFTER 236 - CYCLE TEST



FIGURE 20, ROLLERS 7 AND 8 AFTER 236 - CYCLE TEST



LOADER SIMULATION

GENERAL ARRANGEMENT —
CARGO SYS. MOCK-UP
KC-10A

ROLLERS 4 AND 5 ROTATED 90° CW

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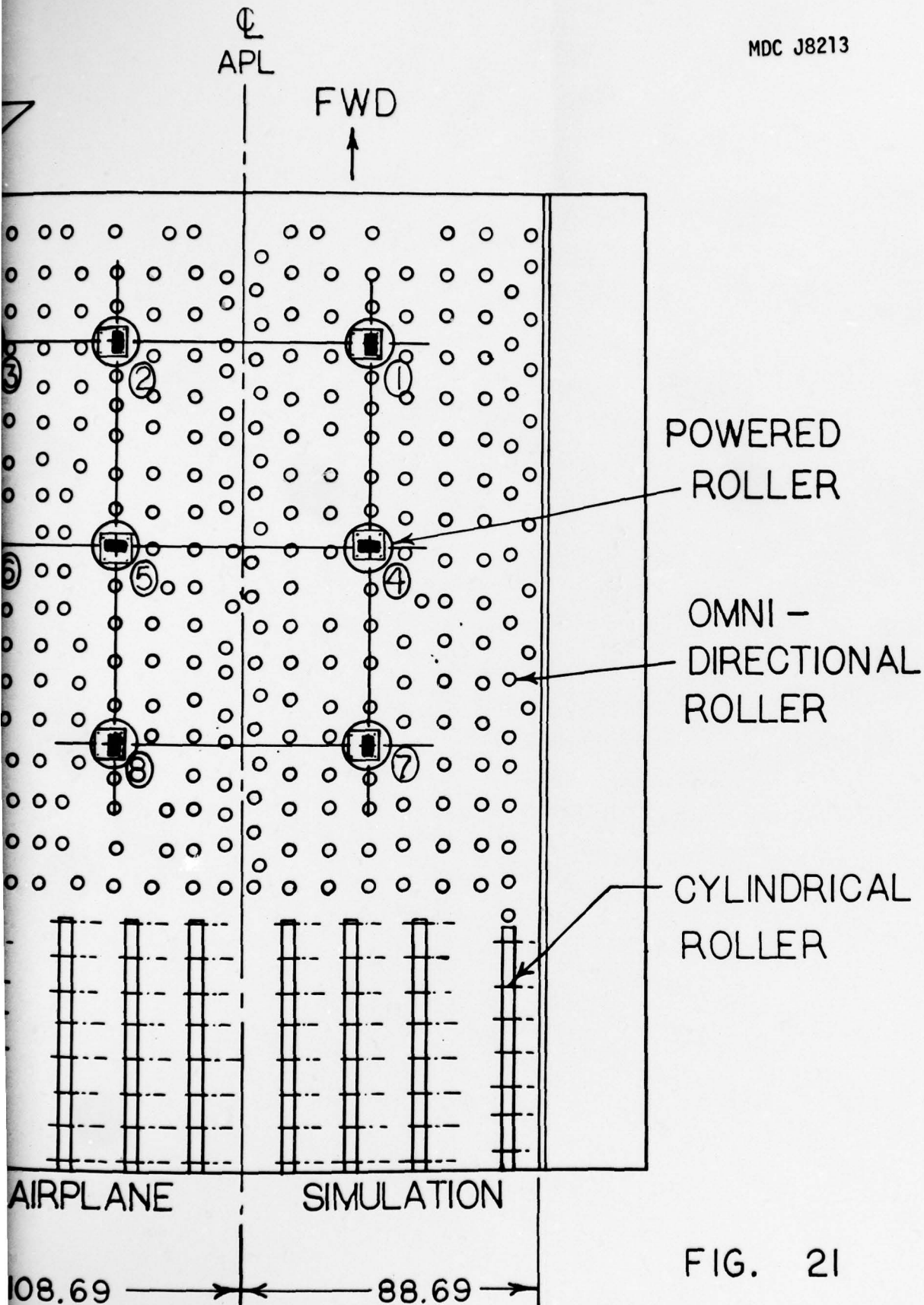


FIG. 21

2

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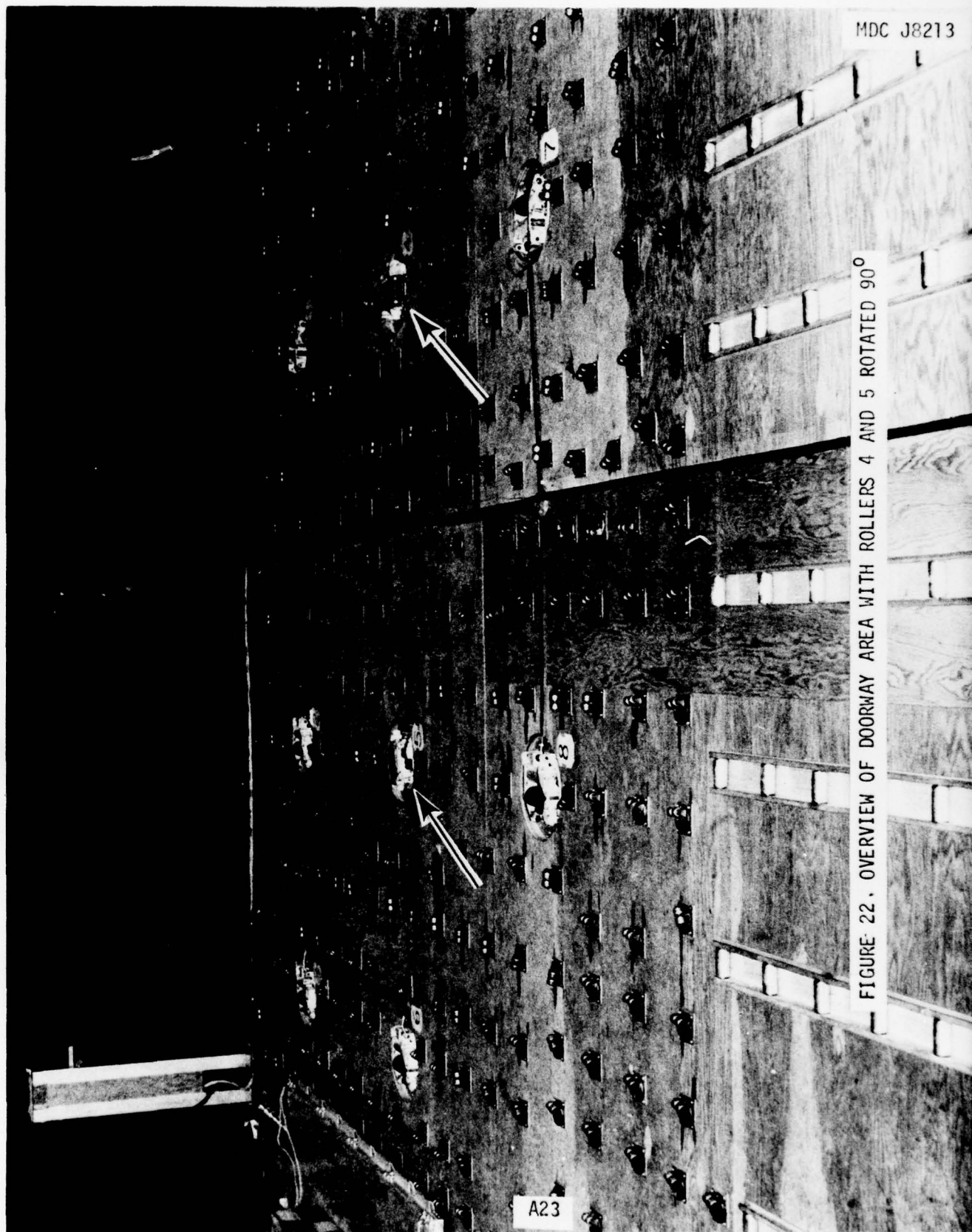


FIGURE 22. OVERVIEW OF DOORWAY AREA WITH ROLLERS 4 AND 5 ROTATED 90°

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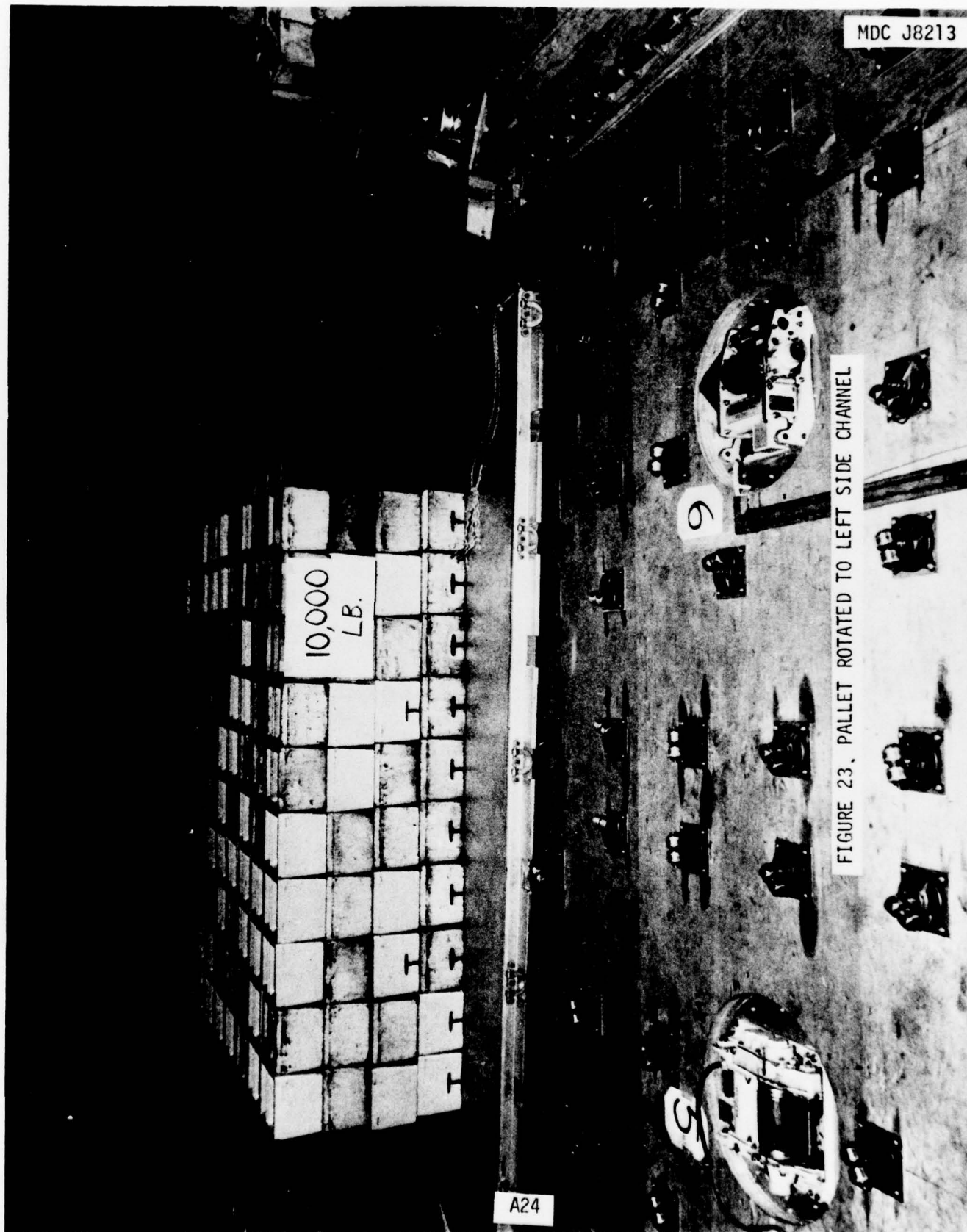


FIGURE 23. PALLET ROTATED TO LEFT SIDE CHANNEL

A24

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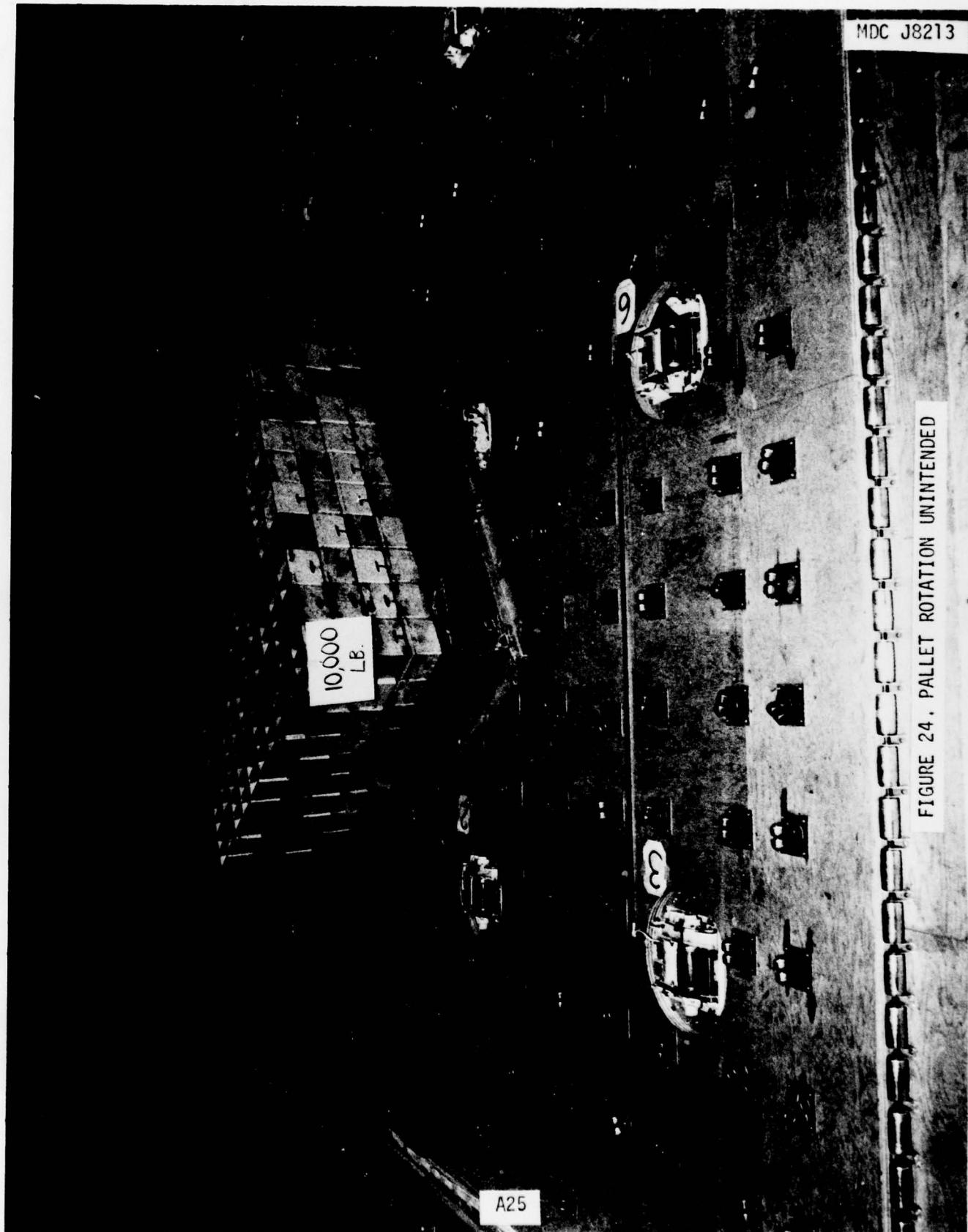


FIGURE 24. PALLET ROTATION UNINTENDED

A25

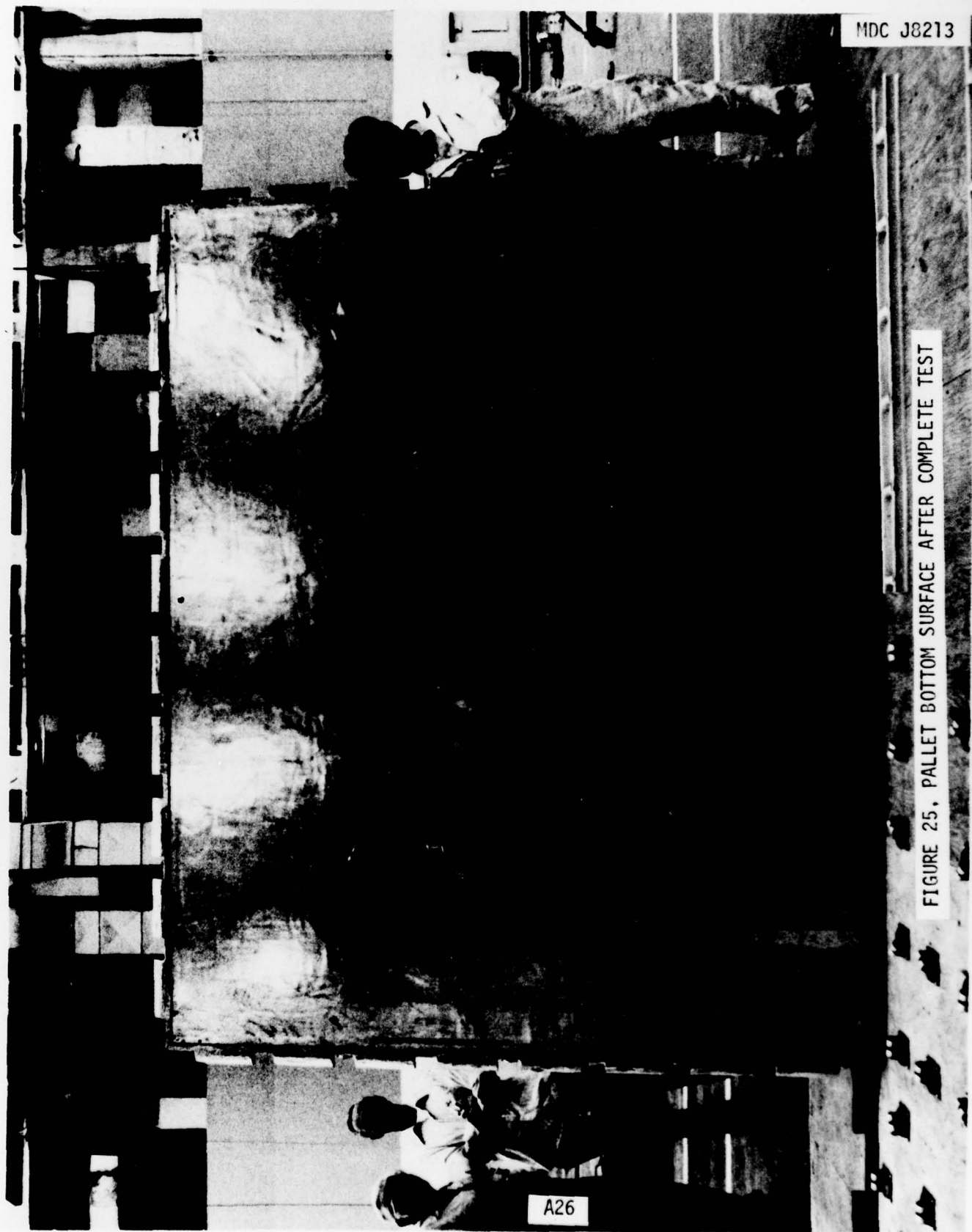


FIGURE 25. PALLET BOTTOM SURFACE AFTER COMPLETE TEST

MDC J8213

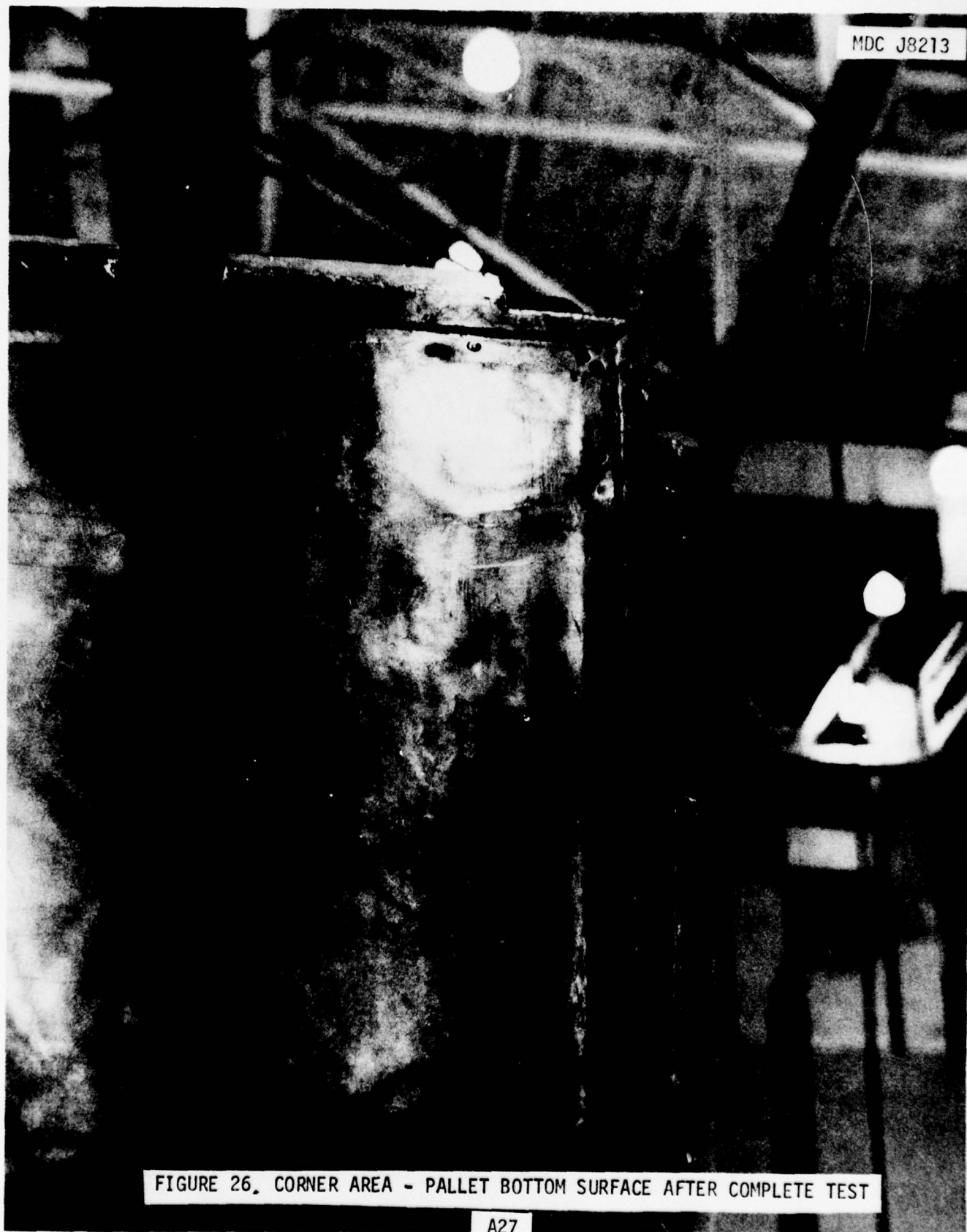


FIGURE 26. CORNER AREA - PALLET BOTTOM SURFACE AFTER COMPLETE TEST

A27

APPENDIX B
WORKSHEETS OF CARGO
MOCK-UP TEST

MCDONNELL DOUGLAS CORPORATION

MDC JF213

54 1 of 2

B-2

ROLLERS 4 & 5 ROTATED 90° CW

54 2 OF 2

B-3

APPENDIX C
KC-10A PALLET STUDY

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KC-10A PALLET STUDY1.0 PROBLEM

Determine a spectrum of pallet loads single and coupled, that are likely to be carried aboard the KC-10A during its 20 year life span. These data will be utilized for the testing of the Cargo Loading Mockup. The objective is to simulate representative cargo operations on the Cargo Loading Mockup to evaluate wear on the powered rollers.

2.0 STUDY APPROACH

The primary mission of the KC-10A is as a tanker aircraft. The accommodation for cargo is considered secondary but an important role.

To determine the number and character of single and coupled pallet loads carried during the KC-10A life time, the following must be known:

1. Type of cargo mission to be flown.
2. Number of cargo missions by type of mission over the 20 year life span.
3. Type of cargo carried on these missions.
4. Determine from the type of cargo the number of single and coupled pallets required for airlift.
5. Determine the approximate weight of these single and coupled pallets.

3.0 STUDY APPROACH AND ASSUMPTIONS

The following assumptions were used in this study:

3.1 TYPE OF CARGO MISSIONS

The only information available for the type of mission the KC-10A will be flying is defined by the mission profiles described in the Statement of Work Appendix II. Although it has been recommended that these mission profiles be only used for Life-Cycle costs, the objectives of this study

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are to determine the wearability of the powered rollers. Therefore, these mission profiles are applicable for this study. Attachment I of this study contains these KC-10A mission profiles.

Three of the ten mission profiles are defined as cargo carrying mission: Mission number 2-TAF DEPLOYMENT/REDEPLOYMENT with 33,756 pounds ACL (allowable cabin load) available, Mission number 3-CARGO TRAINING with 76,000 pounds ACL available, and Mission number 5-CONTINGENCY CARGO with 171,508 pounds of ACL available.

3.2 NUMBER OF CARGO MISSIONS

USAF letter number YT(78-1-8) dated 1 March 1978 indicated that the ATCA annual basic utilization rate was 540 hours per aircraft with the potential surges and contingencies raising the rate to 1200 hours per year per aircraft. This letter is attached as Attachment 2 of this study.

The 540 hour utilization rate is assumed to be peace time and the 1200 hour rate as surge (wartime) rate.

The following assumption is made - During the 20 year time span the KC-10A will fly 5 years at the surge rate (1200 hr/year) and 15 years at the peace-time rate (540 hr/year).

Table 1 was derived to show the total number of missions by profile over the 20 years.

Results indicate that 213 missions (flights) for profile No. 2 would be flown during the 20 years. This was derived as follows:

Peace time —

81 flights/year X 10% flights are profile #2 X 15 years = 122 flights

Surge —

131 flights/year X 10% flights are profile #2 X 5 years = 91 flights

Total flights = 122 + 91 = 213

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TABLE I
ATCA MISSION PROFILES

MISSION NUMBER	MISSION PROFILE	FLIGHT TIME (HOURS)	GROUND TIME (HOURS)	PERCENT FLOWN	CARGO MISSIONS ACL AVAILABLE	TOTAL PEACE-TIME MISSIONS FOR 15 YEARS	TOTAL SURGE MISSIONS FOR 5 YEARS	TOTAL MISSIONS FOR 20 YEARS
1	TAF EMPLOYMENT	7.10	.58	2	-	24	18	42
2	TAF DEPLOYMENT/REDEPLOYMENT	7.33	.58	10	33,756 1b	122	91	213
3	CARGO TRAINING	4.73	.58	1	76,000 1b	12	9	21
4	MAC LONG HAUL AND/OR TRAINING	5.5	.58	30	-	366	272	638
5	CONTINGENCY CARGO	11.62	.58	1	171,508 1b	12	9	21
6	B-52 TRAINING	5.80	.58	6	-	73	54	127
7	B-52 CONTINGENCY (TWO B-52S)	6.82	.58	1	-	12	9	21
8	FIGHTER TRAINING (LOW ALT. 160-220)	5.97	.58	1	-	12	9	21
9	FIGHTER TRAINING (MED. ALT. 260-310)	6.97	.58	40	-	488	362	850
10	FIGHTER TRAINING (MED ALT 260-310) & KC-10A REFUELING TRAINING	8.50	.58	8	-	98	72	170
TOTALS PER 100 FLIGHTS		663	58	100				
YEAR TOTALS BASED ON 540 FLIGHT HOURS PER YEAR		540	47	81.4				
YEAR TOTALS BASED ON 1200 FLIGHT HOURS PER YEAR		1200	105	181				
TOTAL NUMBER OF FLIGHTS OVER 20 YEARS						1219	905	2124

Using the same formula for profiles No. 3 and 5, except using 1%, results in a total of 21 flights each.

3.3 TYPE OF CARGO CARRIED BY MISSION PROFILE

Mission profile Number 2 is defined as a TAF (Tactical Air Force) Deployment/Redeployment. This mission involves the deployment of a fighter/interceptor squadron including the squadron's support equipment. The KC-10A will refuel aircraft as well as carry cargo. The available ACL is 33,756 pounds. The F-15 squadron has been selected for this mission profile.

Mission profile Number 3 is defined as a Cargo Training mission. This mission is assumed to be a normal channel cargo operation transporting palletized cargo from one Air Force base to another. The palletized cargo includes single and coupled pallets. Available ACL is 76,000 pounds.

Mission profile number 5 is defined as a contingency cargo mission. This mission is assumed to be an emergency cargo mission, such as the resupply of ammunition. Available ACL is 171,508 pounds.

3.4 DETERMINE PALLET REQUIREMENTS FOR THE THREE CARGO MISSION PROFILES

This section determines the number of pallets that will be loaded aboard the KC-10A for each type of mission profile during the 20 years.

3.4.1 TAF Deployment/Redeployment Mission Profile

The F-15 squadron's support equipment consist of 198 single items weighing 573,367 lbs. Attachment 3 contains the list of these 198 items sorted by NSN (National Stock Number).

An assumption was made that all equipment would be pre-loaded on 463L pallets before loading into the KC-10A.

Each item on the list was reviewed to determine if a single or double

pallet was required for loading. When possible small items were grouped together on a single pallet. However, a complete study to utilize all of the stacking surface on the pallet was not done. The 198 items results in requiring 94 single pallets and 84 coupled pallets.

A number of items which are loaded on coupled pallets are too long for loading across the aircraft and must be rotated through the cargo door. Figure 1 shows the maximum length of cargo, versus height, that can be loaded without rotation. This figure represents the maximum contours for 463L pallets in the KC-10A. The six inch clearance rule was used to determine if rotation was required.

Table II lists the 18 items which must be rotated through the cargo door. The first 5 items in the table are towbars, which are very long, but weigh only 415 pounds each. These items can be loaded manually rather than using the powered roller systems.

For the F15 squadron the total pallet requirements are:

- 94 - SINGLE PALLETS
- 84 - COUPLED PALLETS:
 - 66 - NO ROTATION REQUIRED
 - 13 - ROTATION REQUIRED
 - 5 - MANUAL ROTATION

These single and coupled pallets represent 262 pallet position for loading in the KC-10A ($94 + (84 \times 2) = 262$).

The configuration of the KC-10A during a TAF deployment/redeployment will either be the 23 pallet/20 passenger mixed configuration or the 27 pallet all cargo configuration. The total number of KC-10A's required to carry the 262 pallet positions are:

23 Pallet System;

$$\frac{262}{23} = 11.4 \text{ or } 12 \text{ KC-10's}$$

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FIGURE I

MDC J8213

DONALDAS AIRCRAFT

MAXIMUM LENGTH OF CARGO LOADABLE WITHOUT ROTATION (INCHES)

(LOADED SYMMETRICALLY ABOUT CENTERLINE)

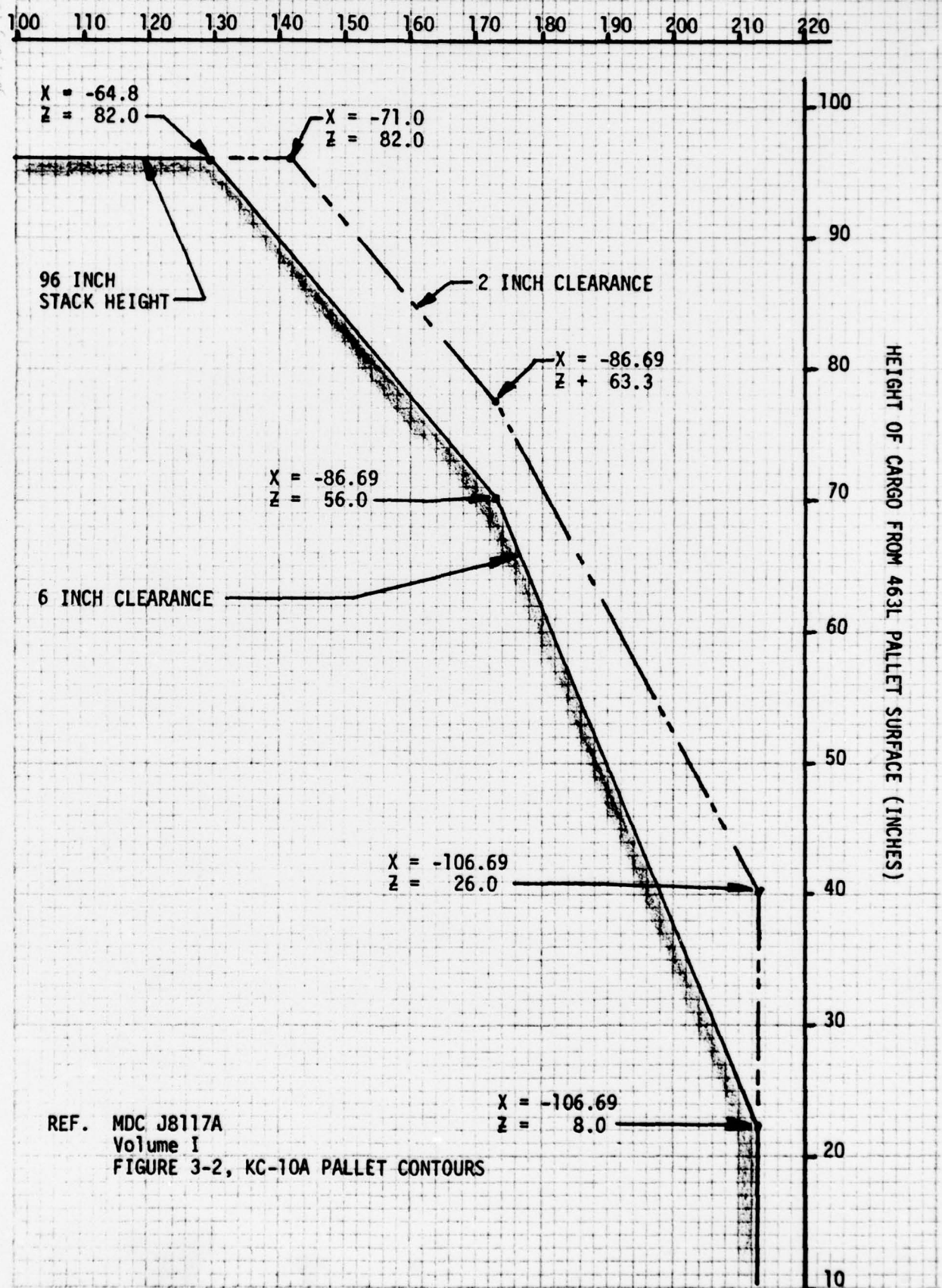


TABLE II - F15 SQUADRON
ITEMS WHICH REQUIRE ROTATION THROUGH THE CARGO DOOR

NO.	NSN	NOMENCLATURE	L	W	H	WT
S009	1730-00-640-8080	TOMBAR A/C	296	57	30	415
S031	1730-00-640-8080	TOMBAR A/C	296	57	30	415
S032	1730-00-640-8080	TOMBAR A/C	296	57	30	415
T016	1730-00-640-8080	TOMBAR A/C	296	57	30	415
T197	1730-00-640-8080	TOMBAR A/C	296	57	30	415
E301	1740-00-713-5908	TRL 3000 W/F15 ENG	216	60	89	4360
T026	1740-00-713-5908	TRL 3000 W/F15 ENG	216	60	89	4360
T027	1740-00-713-5908	TRL 3000 W/F15 ENG	216	60	89	4360
T028	1740-00-713-5908	TRL 3000 W/F15 ENG	216	60	89	4360
T029	1740-00-713-5908	TRL 3000 W/F15 ENG	216	60	89	4360
T030	1740-00-713-5908	TRL 3000 W/F15 ENG	216	60	89	4360
T303	1740-00-713-5908	TRL 3000 W/O ENG	152	58	89	1360
T019	1740-00-713-5908	TRL 3000 W/O ENG	152	58	89	1360
S043	2330-L0-021-3648	TANK DOLLY	228	88	47	863
S044	2330-L0-021-3648	TANK DOLLY	228	88	47	863
T214	4920-00-438-3812	M37 THRUST TRL	201	64	85	5490
T215	4920-00-438-3812	M37 FUEL TK TLR	192	97	96	5360
T184	3990-00-820-9890	463L PALLET TRAIN	176	108	84	9910

DIMENSIONS IN INCHES AND WEIGHT IN POUNDS

27 Pallet System:

$$\frac{262}{27} = 9.7 \text{ or } 10 \text{ KC-10's}$$

However, the limiting factor for carrying the TAF support equipment is ACL,

$$\frac{573,367 \text{ (lb.) total weight of items}}{33,756 \text{ lb. ACL}} = 16.9 \text{ or } 17 \text{ KC-10's}$$

To determine the average number of pallets per KC-10, divide the total number of pallets type by the total number of KC-10's required to carry the equipment.

Single Pallets = 94

$$\frac{94}{17} = 5.53 \text{ Pallets/KC-10}$$

Coupled Pallets (no rotation required)

$$\frac{66}{17} = 3.88 \text{ Pallets/KC-10}$$

Coupled Pallets (rotation required)

$$\frac{13}{17} = 0.76 \text{ Pallets/KC-10}$$

Coupled Pallets (manual rotation)

$$\frac{5}{17} = 0.29 \text{ Pallets/KC-10}$$

To determine the total number of pallets by loading configuration that will be loaded during the 20 year life span, multiply the pallets by the total number of sorties each KC-10 will experience during the 20 years. The total number of sortie/KC-10 is 213 for the 20 years.

This results in the following:

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TAF DEPLOYMENT/REDEPLOYMENT MISSION PROFILE

Total number of single pallets = $213 \times 5.53 = 1178$

Total number of coupled pallets

(no rotation) = $213 \times 3.88 = 826$

Total number of coupled pallets

(rotation required) = $213 \times 0.76 = 162$

Total number of coupled pallets

(manual rotation) = $213 \times 0.29 = 62$

3.4.2 Cargo Training Mission Profile

This mission involves the accommodation of 463L pallets in a normal cargo operation. The preloaded 463L pallets assigned to the nine types of fighter/interceptor squadrons were used to represent the 463L pallet world.

These are 442 pallets listed in the nine squadrons, 18 of these pallets are coupled pallets or 4% of the total.

The configuration of the KC-10A for a cargo training mission is assumed to be the 23 pallet system (delivery configuration).

The total number of coupled pallets per aircraft is 4% of 23 pallets or 0.92 coupled pallets/KC-10. The total number of single pallets is $23 \times 96\% = 21.08$ pallets/KC-10.

The KC-10 will fly 21 cargo training missions during its 20 year life span. Therefore the total number of pallets loaded will be:

Coupled Pallets:

$21 \times 0.92 = 19$ pallets/KC-10A

Single Pallets:

$21 \times 21.08 = 444$ pallets/KC-10A

3.4.3 Contingency Cargo Mission Profile

This mission involves the carrying of ammunition loaded on single 463L

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C-10

pallets.

The KC-10A pallet configuration will be the 27 pallet all cargo configuration where 11 pallets must be rotated 90 degrees for loading on the left side of the aircraft and 16 pallets require no rotation.

Total number of pallets loaded in the 21 KC-10's during the 20 years are:

Single Pallets (rotation required):

$$21 \times 11 = 231 \text{ pallets/KC-10A}$$

Single Pallets (no rotation):

$$21 \times 16 = 336 \text{ pallets/KC-10A}$$

3.4.4 Determine Approximate Weight of Pallets

SINGLE PALLETS (NO ROTATION)

Figure 2 show a distribution of 463L pallet net weight from a previous Douglas study. The pallet weights range from 300 pounds to 9700 pounds with the average net weights at 4661 pounds. When adding the tare weight of 354 pounds (nets and pallet) to these values, the average weight is 5,015 pounds and the minimum weight 6.54 pounds and 10,054 pounds maximum weight. The weight distribution between 1000 and 8500 pounds is fairly uniform.

For test purposes for the cargo loading mockup, the weights selected for a single pallet are 90% at 5,000 pounds and 10% at 10,000 pounds. These values represent higher weights in comparison to distribution represented in Figure 2, but simplify testing setup. These values will be used for single pallets where no rotation is required.

SINGLE PALLETS (ROTATION REQUIRED)

The single pallets selected are loaded with ammunition. Douglas conducted a CRAD study in 1975 which investigated Army ammunition resupply characteristics. From this study, it was estimated that 25% of the pallets would weigh approximately 10,000 pounds and the remaining 75%, 5000 pounds.

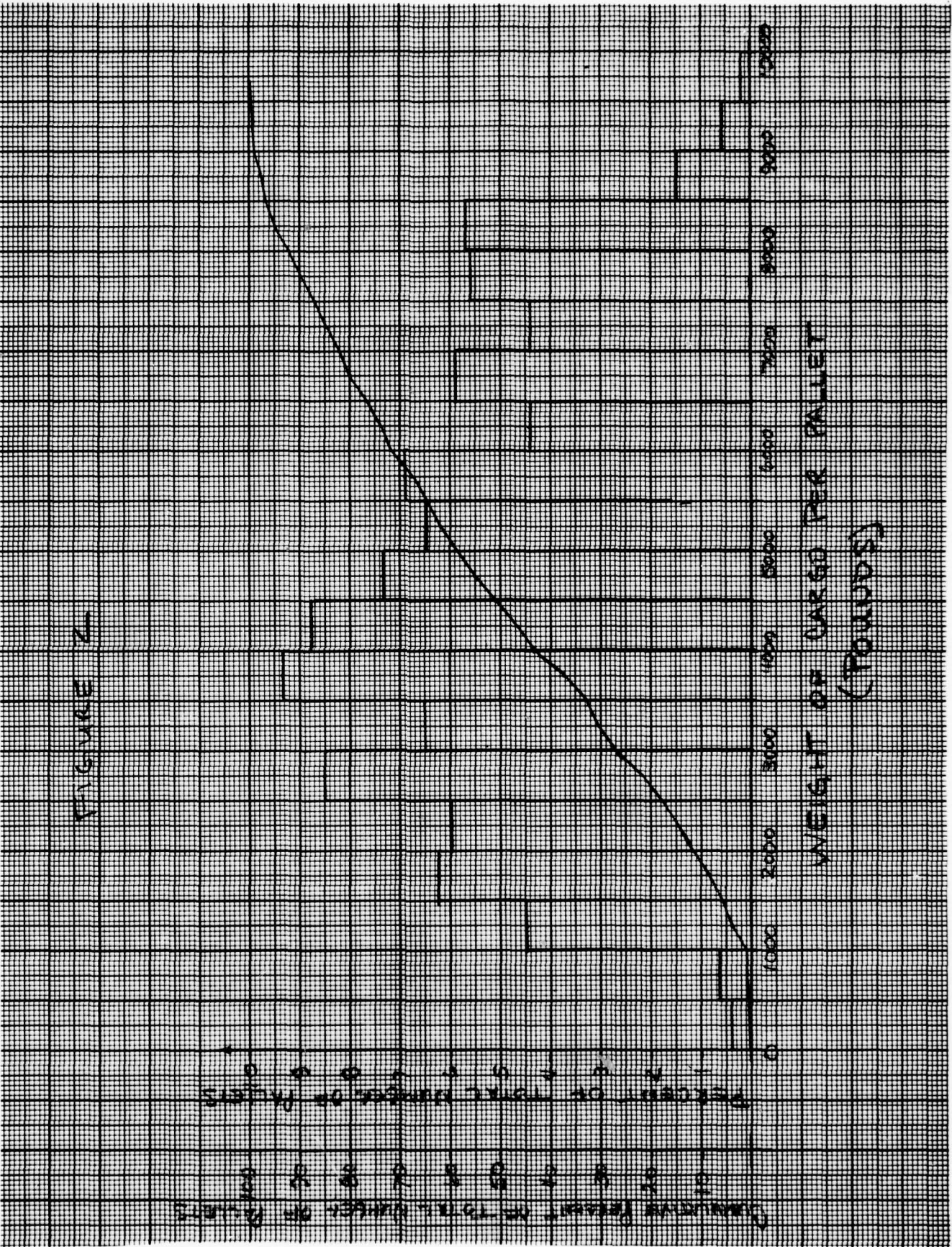
FIGURE 2

PERCENT OF TOTAL WEIGHT OF PALLET
 0 10 20 30 40 50 60 70 80 90 100

PERCENT OF TOTAL WEIGHT OF PALLET
 0 10 20 30 40 50 60 70 80 90 100

0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000 11000 12000

WEIGHT OF CARGO PER PALLET
 (POUNDS)



COUPLED PALLETS (NO ROTATION)

Coupled pallets are used to accommodate wheeled vehicles and equipment. Reviewing the weights of the items, which are not rotated, the weights for 10% of the pallets is 12,000 pounds (6000 pounds per pallet) and 4000 pounds (2000 pounds per pallet) for the remaining 90%.

COUPLED PALLETS (ROTATION REQUIRED)

Coupled pallets which require rotation consist primarily of aircraft engines on transportation trailers. The weight of these items are not evenly distributed on the coupled pallets. The weights have been estimated to be 6000 pounds (4000/2000 pounds) for 80% of the pallets and 10,000 pounds (6000/4000 pounds) for 20% of the pallets. These weights apply for coupling on the 88 or 108 inch dimension of the pallet.

3.5 SUMMARY OF PALLET LOADING REQUIREMENT FOR THE KC-10A DURING 20 YEARS

Table III list the summary of pallet loadings for the three mission profiles over a 20 year time span for each KC-10A. Included are the estimated weights for the pallets.

TABLE III
SUMMARY - PALLET STUDY

TOTAL NUMBER OF PALLET LOADING OVER A 20 YEAR SPAN (ASSUMED 5 YEARS AT THE SURGE RATE OF 1200 FLIGHT HOURS/YEAR AND 15 YEARS AT THE PEACE TIME RATE OF 540 FLIGHT HOURS/YEAR)

	MISSION #2 TAF DEPLOYMENT/ REDEPLOYMENT *	MISSION #3 CARGO TRAINING	MISSION #5 CONTINGENCY CARGO	TOTAL
SINGLE PALLETS NO ROTATION REQUIRED 90% @ 5000 LB., 10% @ 10,000 LB.	1178	444	336	1958
SINGLE PALLETS ROTATION REQUIRED 75% @ 5000 LB., 25% @ 10,000 LB.	-	-	231	231
COUPLED PALLETS 108 INCH DIMENSION NO ROTATION REQUIRED 90% @ 4000 LB. (2K/2K), 10% @ 12,000 LB. (6K/6K)	826	19	-	845
COUPLED PALLETS ROTATION REQUIRED - 103 INCH DIMENSION 80% @ 6000 LB. (2K/4K), 20% @ 10,000 LB. (4K/6K) - 88 INCH DIMENSION 80% @ 6000 LB. (2K/4K), 20% @ 10,000 LB. (4K/6K)	81 81	- -	- -	162
COUPLED PALLETS MANUAL ROTATION (415 LB. TOMRAR)	62	-	-	62

* ASSUMES TAF DEPLOYMENT EQUIPMENT IS PREPALLETIZED AND NOT LOADED ON A PALLET SUBFLOOR.

MEMORANDUM

9/7/78

MDC J8213
Attachment 1

TO: C. W. Andrews, C1-251
FROM: R. D. Dangaran, C1-253
SUBJECT: KC-10A MISSION PROFILES

COPIES: K. Akamatsu, Avionics
F. G. Appleby, Project
K. M. Carpenter, Electrical
R. L. Clepper, Structures
D. L. Gibler, Project
J. J. Heffernan, Acoustics
R. W. Howard, Environmental
G. W. Johnson, Maintainability
R. E. McConnelly, ARB
W. L. Miles, Human Factors
O. J. Minnich, Interiors
J. A. Riccobono, Mechanical
G. A. Schlanert, Project
H. F. Winchester, Power Plant

Attached is a copy of the ten basic KC-10A mission profiles described in the Statement of Work Appendix II. The revised mission profile number 9R and the modified mission profile number 9A are also included. Mission profile number 9A describes the hose and reel refueling method to be used in the reliability allocations, assessments and analysis report.

These profiles describe operational characteristics that can be used in establishing design criteria and reliability analysis requirements. Timing of some events and the amount of time required to checkout and/or stow the refueling equipment were estimated based on the best available information at the time.

Comments and/or corrections to these profiles are solicited.

R. D. Dangaran
R. D. Dangaran
KC-10A Reliability & Safety

yd
attach.

9/7/78

MISSION NUMBER	MISSION PROFILE	FLIGHT TIME (HOURS)	GROUND TIME (HOURS)	PERCENT FLOIN	NO. OF TOUCH & GO LANDINGS	NO. OF BOOM HOOKUPS	NO. OF WARRSI HOOKUPS	NO. OF HOSE HOOKUPS	FUEL OFFLOAD (POUNDS)	FUEL ONLOAD (POUNDS)	NO. OF BOOM DEPLOYMENTS (CYCLES)	NO. OF HOSE DEPLOYMENTS (CYCLES)	FUEL TRANSFER ONLOADING TIME (HOURS)	FUEL TRANSFER OFFLOADING TIME (HOURS)	*2001 COMPUTER OPERATING TIME (HOURS)	BOOM FLT. COYT. OPERATING TIME (HOURS)	INDEPENDENT DISC. OPERATING TIME (HOURS)	STANDARD INTERFACE TIME (HOURS)
1	TAC EMPLOYMENT	7.10	.58	2	0	12	0	0	51,000	0	3	0	0	.75	5.60	1.33	5.18	5.35
2	TAC DEPLOYMENT/REDEPLOYMENT	7.33	.58	10	0	20	0	0	150,000	0	5	0	0	1.43	6.32	2.18	5.90	6.07
3	CARGO TRAINING	4.73	.58	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	MAC LONG HAUL AID/OR TRAINING	5.50	.58	30	5	3	0	0	95,000	0	1	0	0	.47	2.62	.80	2.20	2.37
5	CONTINGENCY CARGO	11.62	.50	1	0	0	1	0	0	136,418	0	0	.28	0	0	0	0	0
6	B-52 TRAINING	5.80	.58	6	3	12	0	0	50,000	0	2	0	0	1.50	4.10	2.00	3.68	3.85
7	B-52 CONTINGENCY TWO B-52s	6.82	.58	1	0	2	0	0	140,000	0	1	0	0	1.08	4.12	1.50	3.70	3.87
8	FIGHTER TRAINING (MED. ALTITUDE 160-220)	5.97	.58	1	3	24	0	0	80,000	0	2	0	0	1.50	4.20	2.00	3.78	3.95
9	FIGHTER TRAINING (MED. ALTITUDE 260-310)	6.97	.58	40	5	48	0	0	160,000	0	2	0	0	2.00	4.75	2.50	4.33	4.50
10	FIGHTER TRAINING (MED. ALTITUDE 260-310) & KC-10A REFUELING TRAINING	8.50	.58	8	5	48	6	0	160,000	80,000	2	0	.75	2.00	4.73	2.50	4.32	4.48
TOTALS PER 100 FLIGHTS		663	58	100	411	2716	49	0	12652 K	776,418	197	0	6.28	137	414	106	320	329
YEAR: TOTALS BASED ON 540 FLIGHT HOURS PER YEAR		540	47	81	335	2212	40	0	10305 K	632,377	160	0	5.11	112	337	152	261	317
RELIABILITY MODIFIED MISSIONS																		
9R	FIGHTER TRAINING (BOOM) (MED. ALTITUDE 260-310)	6.97	.58	38.8	5	48	0	0	160,000	0	2	0	0	2.00	4.75	2.50	4.33	4.50
9A	FIGHTER TRAINING (HOSE) (MED. ALTITUDE 260-310)	6.97	.58	1.2	5	0	0	43	120,000 (EST)	0	0	2	0	2.00	0	0	0	4.50

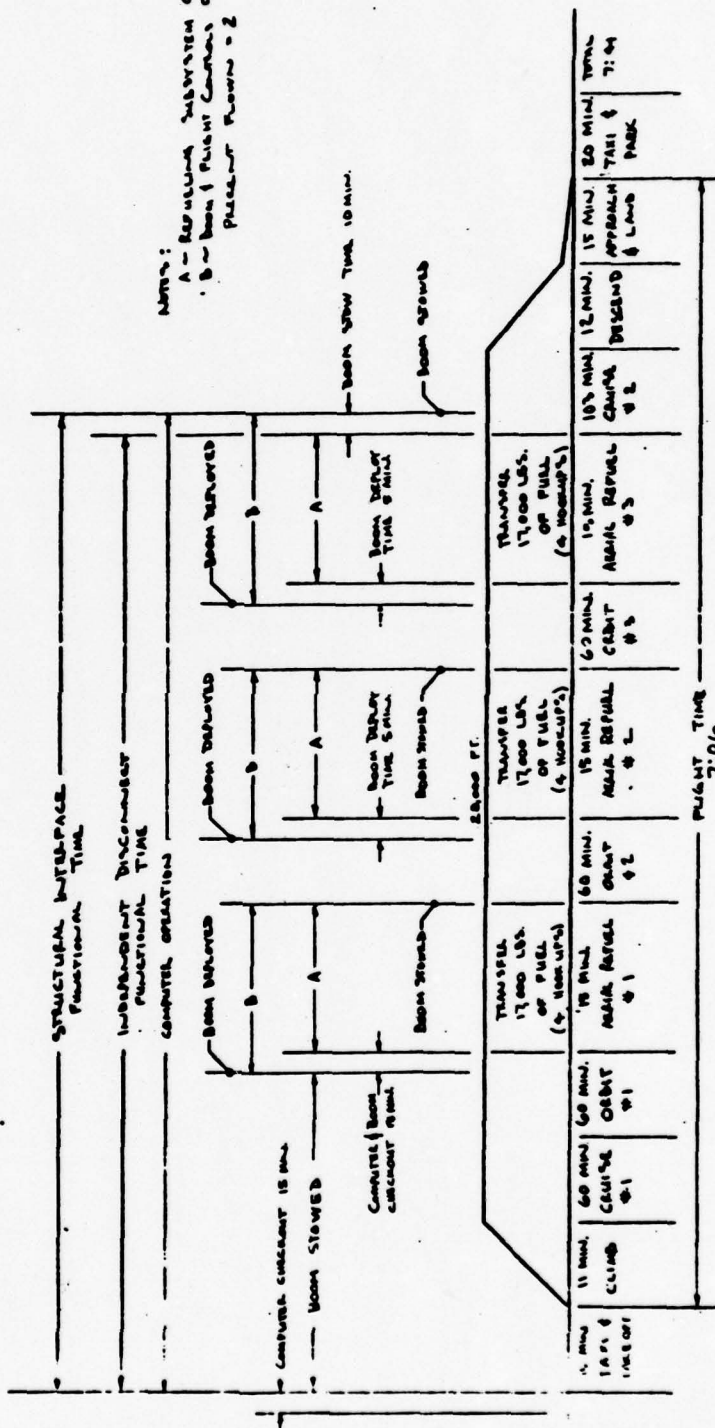
* INCLUDES 15 MINUTES GROUND CHECKOUT TIME

MDC J8213
Attach. 1

Notes:

- A - Representing Subsystem Operations
- B - Based Patient Care Operations

Present Flow = 2

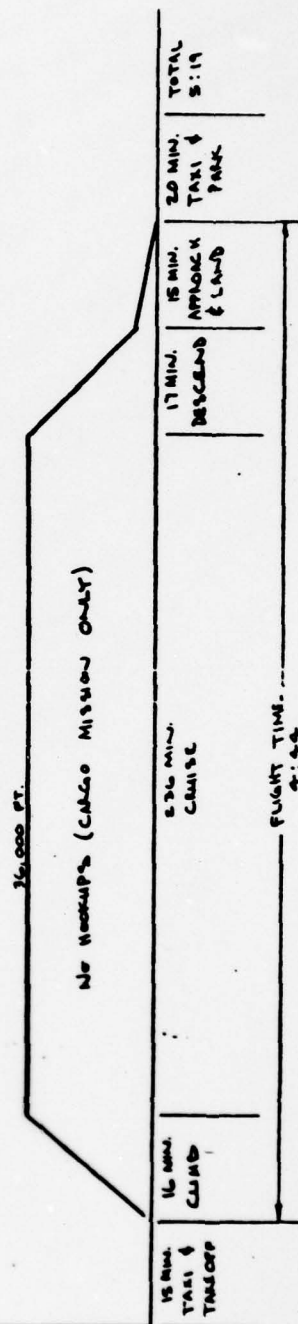


MISSION PROFILE NUMBER 1
TAC EMPLOYMENT

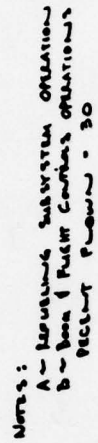


Constant alt of 36,000 ft.

Notes:
PICCART PLANNED-1

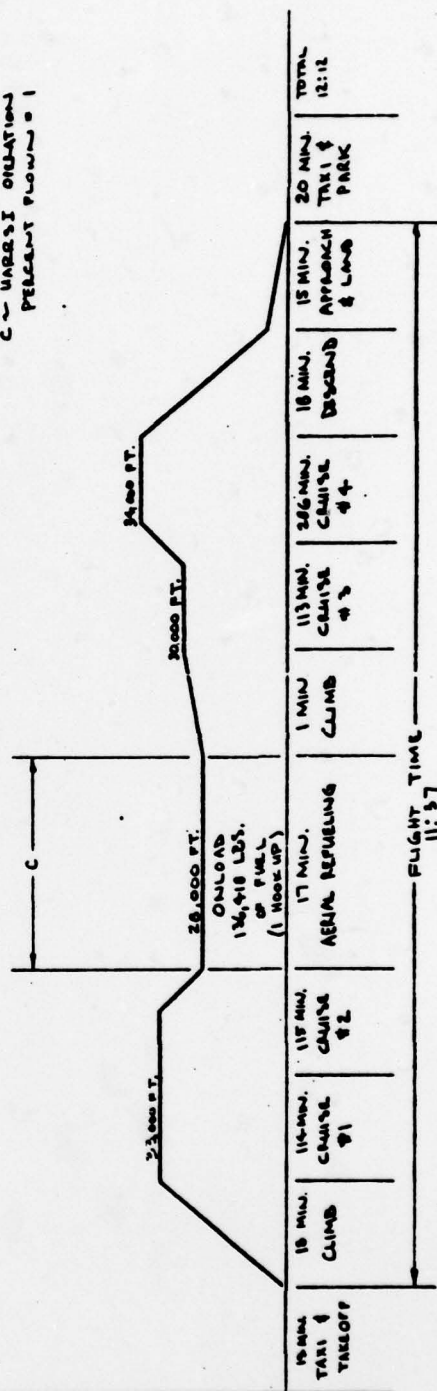


MISSION PROFILE NUMBER 3
CARGO TRAINING



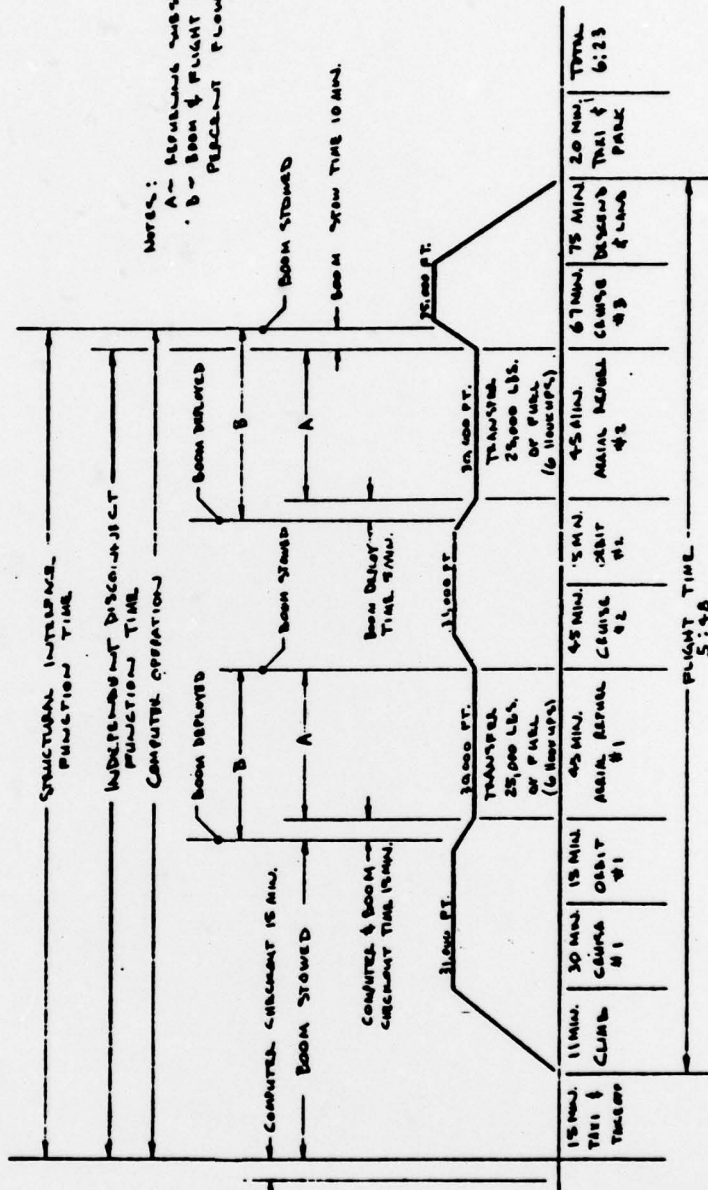
MISSION PROFILE NUMBER 4
MAC LONG Haul AND /OR TRAINING

COMPUTER OFF & BOOM FORWARD



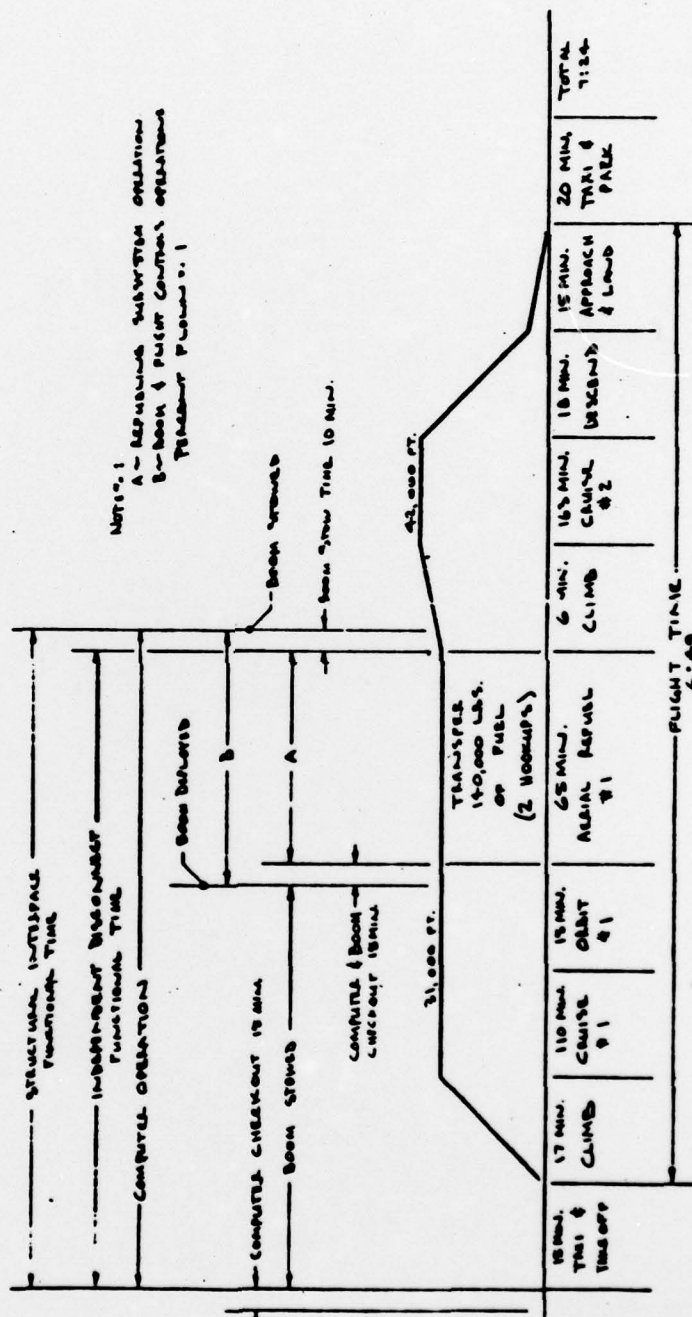
MISSION	PROFULE	NUMBER	5
	CONTINGENCY	CARGO	

NOTES:
A - AIRBORNE WEAPON SYSTEM CAPABILITY
B - BOMB & FLIGHT CONTROLS OPERATIONS
PERCENT FLOWING = 6

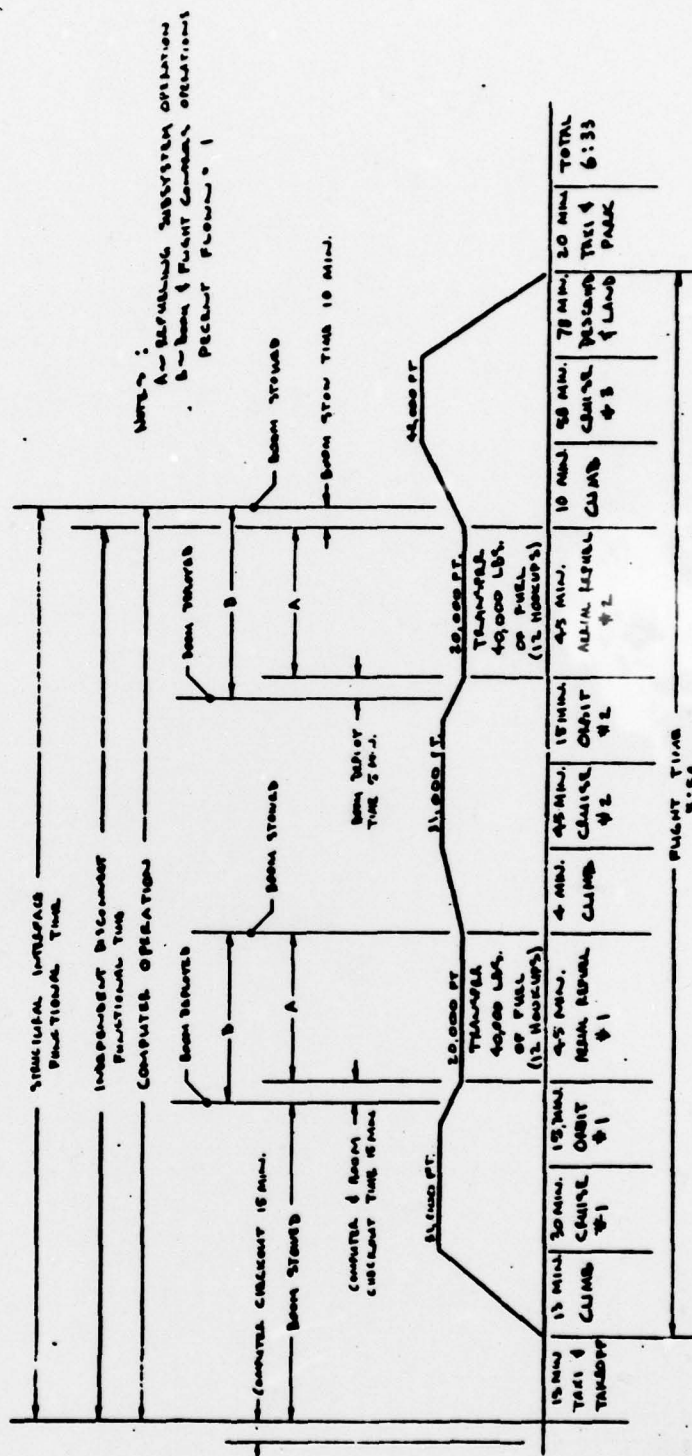


MISSION PROFILE NUMBER 6

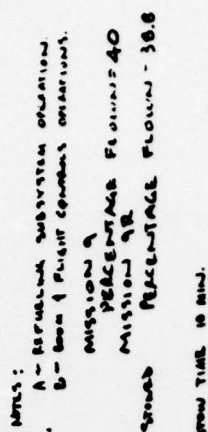
B-52 TRAINING



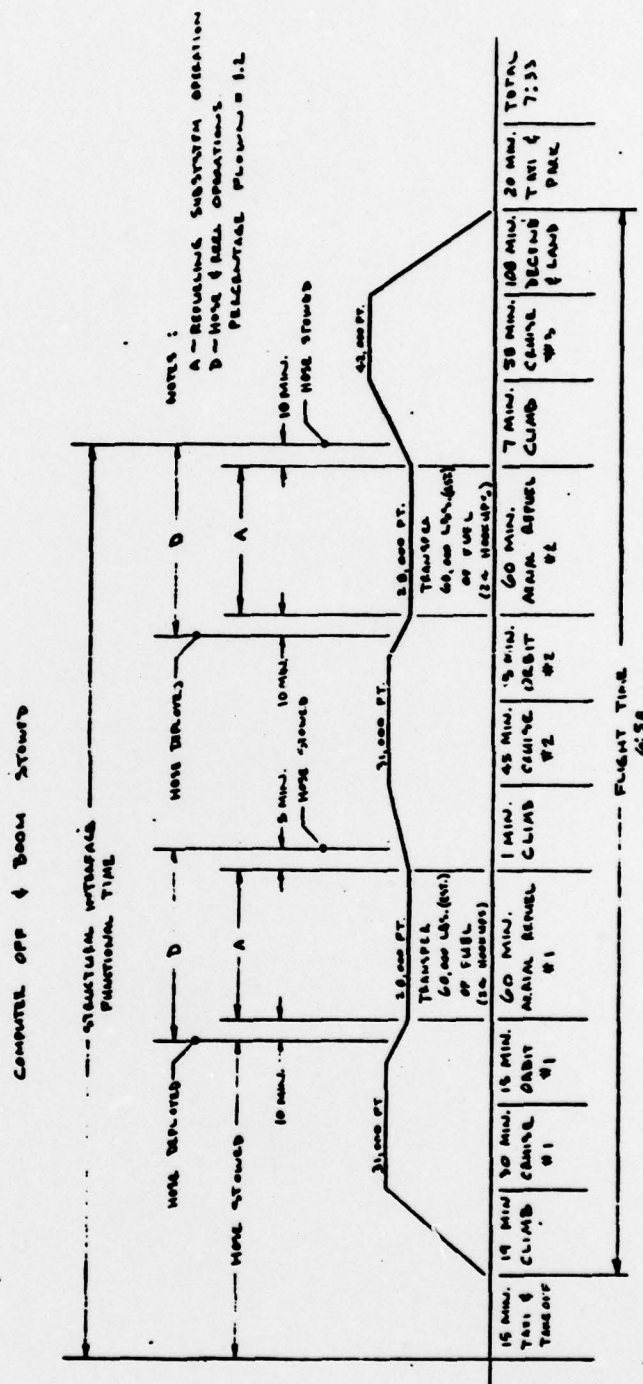
MISSION PROFILE NUMBER 7
B-52 CONTINGENCY (TWO B-52's)



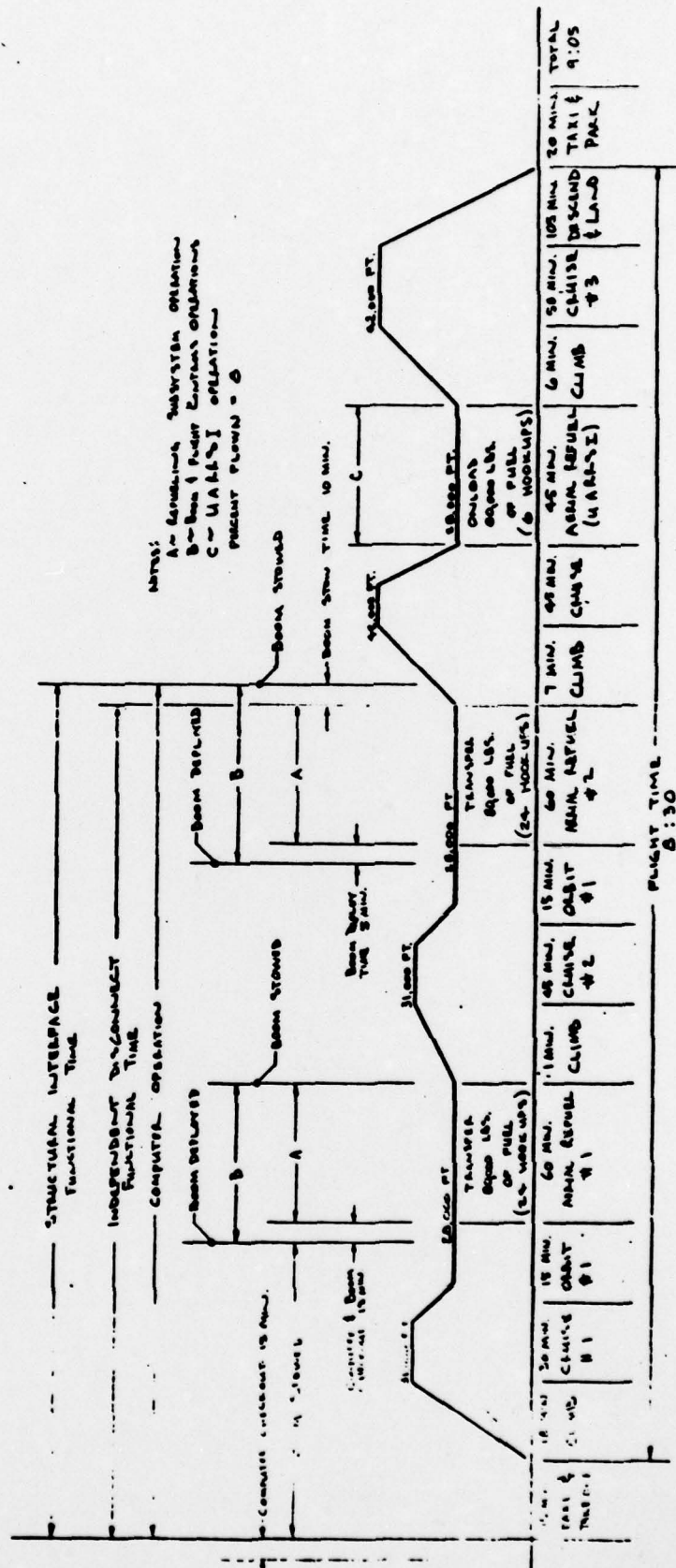
MISSION PROFILE NUMBER 8
FIGHTER TRAINING (LOW ALTITUDE 160-220)



FIGHTER TRAINING (MED ALTITUDE 260-310)



MISSION PROFILE NUMBER 9A



MISSION PROFILE NUMBER 10
FIGHTER TRAINING & KC-10A REFUELING TRAINING
(MED ALTITUDE 260-310)

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE ACQUISITION LOGISTICS DIVISION (AFLC)
WRIGHT-PATTERSON AIR FORCE BASE, OHIO 45433



REPLY TO
ATTN OF: YT (78-1-8)

1 MAR 1978

SUBJECT: ATCA Utilization Rate

CORRESPONDENCE

RECD MAR 10 - 11:00 AM

TO: NAVPRO

CONTROL C1-304

Douglas Aircraft Company
Attn: Mr. G. D. Staffieri
Mail Station C1-241 (35-33)
3855 Lakewood Boulevard
Long Beach, California 90846

End. 1	3 MAR 78
From: Naval Plant Rep. Office	
To: Douglas Aircraft Co., Long Beach, Calif.	
For: Action indicated	
<input checked="" type="checkbox"/>	Information
<input type="checkbox"/>	Action
<input type="checkbox"/>	Reply Prior To

C. A. Kjelland
C. A. KJELLAND
By direction

IN TURN

1. Per your request at the ATCA system review, 8 February 1978, the following information is provided.
2. Current Air Force planning is for an annual basic utilization rate of 540 hours per aircraft, plus surges and contingencies which may raise this rate to 1200 hours per year. Mission distribution shall be as specified in the statement of work, Appendix II. This planned utilization rate, however, shall not effect the specification requirement for a boom with a structural life of at least 30,000 hours (Ref ATCA Specification, Paragraph 03-80.01.00).

Thomas E. Baman

THOMAS E. BAMAN
Dep Program Manager for Business
Dep for Advanced Tanker/Cargo
Aircraft



CORRESPONDENCE CONTROL C1-303				
Activity For	Reply Action	Comp	Info	
Engineering				
Product Support				
Program Support				
Contract				
Quality Assurance				
Logistics				
Human Resources				



01006

S = SINGLE PALLET
C = COMBINED PALLET

FANTER - QUALITÄT UND EQUIPMENT LASTING, NEVER LOOSING

UNCLASSIFIED BY 6501 MAJL/KALC
SQUADRON TYPE (MINOR) **

[illegible]

SUB TOTAL: 99.977

FLANTER SQUARE ELEMENT LISTING, NOV 70

***** SENT TO BY NSA(14060) AND SWA2KUB. TYPE(14PRK) **

[illegible]

Sum Total 190,548

FLIGHT SQUADRON EQUIPMENT LISTING, NOV76

DATA SORTED BY NAME, ALPHABETICALLY, SQUADRON TYPE (MINOR)**

NAME	NAT'L	STOCK NO.	DESCRIPTION	WEIGHT	LEN	WTH	HGT	SVN
1111	3990-00-000-9990	4031 PALLET	4031 PALLET	3178	88	108	60	F15-S
1112	3990-00-000-9990	4031 PALLET	4031 PALLET	4550	88	108	70	F15-S
1113	3990-00-000-9990	4031 PALLET	4031 PALLET	4462	176	108	84	F15-S
1114	3990-00-000-9990	4031 PALLET	4031 PALLET	5910	88	108	80	F15-S
1115	3990-00-000-9990	4031 PALLET	4031 PALLET	3363	88	108	80	F15-S
1116	3990-00-000-9990	4031 PALLET	4031 PALLET	4130	88	108	80	F15-S
1117	3990-00-000-9990	4031 PALLET	4031 PALLET	4462	88	108	80	F15-S
1118	3990-00-000-9990	4031 PALLET	4031 PALLET	3120	88	108	80	F15-S
1119	3990-00-000-9990	4031 PALLET	4031 PALLET	3785	88	108	80	F15-S
1120	3990-00-000-9990	4031 PALLET	4031 PALLET	3606	88	108	80	F15-S
1121	3990-00-000-9990	4031 PALLET	4031 PALLET	2775	88	108	80	F15-S
1122	3990-00-000-9990	4031 PALLET	4031 PALLET	2775	88	108	80	F15-S
1123	3990-00-000-9990	4031 PALLET	4031 PALLET	7576	88	108	80	F15-S
1124	3990-00-000-9990	4031 PALLET	4031 PALLET	7007	88	108	80	F15-S
1125	3990-00-000-9990	4031 PALLET	4031 PALLET	3447	88	108	80	F15-S
1126	3990-00-000-9990	4031 PALLET	4031 PALLET	4310	88	108	80	F15-S
1127	3990-00-000-9990	4031 PALLET	4031 PALLET	4339	88	108	80	F15-S
1128	3990-00-000-9990	4031 PALLET	4031 PALLET	7927	88	108	80	F15-S
1129	3990-00-000-9990	4031 PALLET	4031 PALLET	4108	88	108	80	F15-S
1130	3990-00-000-9990	4031 PALLET	4031 PALLET	4499	88	108	80	F15-S
1131	3990-00-000-9990	4031 PALLET	4031 PALLET	2944	88	108	80	F15-S
1132	3990-00-000-9990	4031 PALLET	4031 PALLET	561	88	108	80	F15-S
1133	3990-00-000-9990	4031 PALLET	4031 PALLET	6918	88	108	80	F15-S
1134	3990-00-000-9990	4031 PALLET	4031 PALLET	7224	88	108	80	F15-S
1135	3990-00-000-9990	4031 PALLET	4031 PALLET	2904	88	108	80	F15-S
1136	3990-00-000-9990	4031 PALLET	4031 PALLET	1740	88	108	80	F15-S
1137	3990-00-000-9990	4031 PALLET	4031 PALLET	3029	88	108	80	F15-S
1138	3990-00-000-9990	4031 PALLET	4031 PALLET	440	88	108	80	F15-S
1139	3990-00-000-9990	4031 PALLET	4031 PALLET	4377	88	108	80	F15-S
1140	3990-00-000-9990	4031 PALLET	4031 PALLET	6025	88	108	80	F15-S
1141	3990-00-000-9990	4031 PALLET	4031 PALLET	3157	88	108	80	F15-S
1142	3990-00-000-9990	4031 PALLET	4031 PALLET	1330	88	108	80	F15-S
1143	3990-00-000-9990	4031 PALLET	4031 PALLET	1330	88	108	80	F15-S
1144	3990-00-000-9990	4031 PALLET	4031 PALLET	1330	88	108	80	F15-S
1145	3990-00-000-9990	4031 PALLET	4031 PALLET	1330	88	108	80	F15-S
1146	3990-00-000-9990	4031 PALLET	4031 PALLET	1330	88	108	80	F15-S
1147	3990-00-000-9990	4031 PALLET	4031 PALLET	1330	88	108	80	F15-S
1148	3990-00-000-9990	4031 PALLET	4031 PALLET	1330	88	108	80	F15-S
1149	3990-00-000-9990	4031 PALLET	4031 PALLET	1330	88	108	80	F15-S
1150	3990-00-000-9990	4031 PALLET	4031 PALLET	1330	88	108	80	F15-S
1151	3990-00-000-9990	4031 PALLET	4031 PALLET	1330	88	108	80	F15-S
1152	3990-00-000-9990	4031 PALLET	4031 PALLET	1330	88	108	80	F15-S
1153	3990-00-000-9990	4031 PALLET	4031 PALLET	1330	88	108	80	F15-S
1154	3990-00-000-9990	4031 PALLET	4031 PALLET	1330	88	108	80	F15-S
1155	3990-00-000-9990	4031 PALLET	4031 PALLET	1330	88	108	80	F15-S
1156	3990-00-000-9990	4031 PALLET	4031 PALLET	1330	88	108	80	F15-S
1157	3990-00-000-9990	4031 PALLET	4031 PALLET	1330	88	108	80	F15-S
1158	3990-00-000-9990	4031 PALLET	4031 PALLET	1330	88	108	80	F15-S
1159	3990-00-000-9990	4031 PALLET	4031 PALLET	1330	88	108	80	F15-S
1160	3990-00-000-9990	4031 PALLET	4031 PALLET	1330	88	108	80	F15-S
1161	3990-00-000-9990	4031 PALLET	4031 PALLET	1330	88	108	80	F15-S
1162	3990-00-000-9990	4031 PALLET	4031 PALLET	1330	88	108	80	F15-S
1163	3990-00-000-9990	4031 PALLET	4031 PALLET	1330	88	108	80	F15-S
1164	3990-00-000-9990	4031 PALLET	4031 PALLET	1330	88	108	80	F15-S
1165	3990-00-000-9990	4031 PALLET	4031 PALLET	1330	88	108	80	F15-S
1166	3990-00-000-9990	4031 PALLET	4031 PALLET	1330	88	108	80	F15-S
1167	3990-00-000-9990	4031 PALLET	4031 PALLET	1330	88	108	80	F15-S
1168	3990-00-000-9990	4031 PALLET	4031 PALLET	1330	88	108	80	F15-S
1169	3990-00-000-9990	4031 PALLET	4031 PALLET	1330	88	108	80	F15-S
1170	3990-00-000-9990	4031 PALLET	4031 PALLET	1330	88	108	80	F15-S
1171	3990-00-000-9990	4031 PALLET	4031 PALLET	1330	88	108	80	F15-S
1172	3990-00-000-9990	4031 PALLET	4031 PALLET	1330	88	108	80	F15-S
1173	3990-00-000-9990	4031 PALLET	4031 PALLET	1330	88	108	80	F15-S
1174	3990-00-000-9990	4031 PALLET	4031 PALLET	1330	88	108	80	F15-S
1175	3990-00-000-9990	4031 PALLET	4031 PALLET	1330	88	108	80	F15-S
1176	3990-00-000-9990	4031 PALLET	4031 PALLET	1330	88	108	80	F15-S
1177	3990-00-000-9990	4031 PALLET	4031 PALLET	1330	88	108	80	F15-S
1178	3990-00-000-9990	4031 PALLET	4031 PALLET	1330	88	108	80	F15-S
1179	3990-00-000-9990	4031 PALLET	4031 PALLET	1330	88	108	80	F15-S
1180	3990-00-000-9990	4031 PALLET	4031 PALLET	1330	88	108	80	F15-S
1181	3990-00-000-9990	4031 PALLET	4031 PALLET	1330	88	108	80	F15-S

SUB TOTAL: 162,306

FLORIAN SWADRON EQUIPMENT LISTING, NOV 2014

DATA SORTED BY NAME(MAJOR) AND SQUADRON TYPE(MINOR)

[illegible]

SUBTOTAL 120,536

GRAND TOTAL = 573,367 LB

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER MDC J8213	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) KC-10A CARGO SYSTEM MOCK-UP TEST		5. TYPE OF REPORT & PERIOD COVERED FINAL TEST/DEMONSTRATION
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Donald P. Danielsen		8. CONTRACT OR GRANT NUMBER(s) F33700-78-C-0001 <i>new</i>
9. PERFORMING ORGANIZATION NAME AND ADDRESS Douglas Aircraft Company 3855 Lakewood Blvd. Long Beach, California 90246		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS Mechanical Engineering Section Douglas Aircraft Company Long Beach, California 90246		12. REPORT DATE 22 August 1979
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17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Powered Rollers; Rotating Cargo Pallets; Cargo Systems, Aircraft		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) A test was conducted on the KC-10A Cargo Handling System Mock-Up to evaluate the performance of the current design of the powered roller system. The test consisted of running a total of 246 load/unload cycles with various weights loaded on the pallets. Of these load/unload cycles, 135 were single HCU-6/E pallets and the remaining 111 were coupled HCU-6/E pallets (2 in train). These cycles simulate over 2 years of KC-10A palletized cargo operations.		

(over)

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

Block 20 (Continued)

The powered roller system functioned very well for the entire spectrum of loads. Single and coupled pallets were loaded laterally or rotated in the doorway easily. This test demonstrated that the system meets or exceeds its design requirements.